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Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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The Magazine Needs You

Now that the new school year has started, let INDUSTRIAL ARTS AND VOCATIONAL EDUCATION know of your new location. No doubt there are many changes to record. The members of the large fraternity of teachers in the fields of industrial arts and vocational education are anxious to know where their friends are. Your professional magazine is glad to let them know, but you must co-operate. We have a personal news column — help us keep it full of up-to-date information.

The same may be said of general news about your school and your courses. Let us broadcast what you are doing. Your fellow teachers would like to know.

In a short while, conventions of all kinds will meet. Give us advance notice of these affairs, and we will gladly publicize them. INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is off the press on the fifteenth of the month. Any information that is to appear in any given issue, therefore, must reach us at least 18 days previous to the day when that magazine is ready to be sent out to its readers.

The present issue, known as the "Projects Number," presents a new selection of articles that we hope will please our readers. Some of these projects are for the beginners; others are for advanced students. Look them over carefully — you may find just what you want for your own classes.

Remember also that if you have a good project, other shop teachers will be glad to hear about it. New projects are always in demand. Help your profession along by augmenting its literary offerings to its members.

This Month's Cover

The illustration chosen for this month's cover of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows a group of students getting acquainted with the instrument used for agricultural surveying at the Tucson Senior High School, Tucson, Ariz. Photograph submitted by Harry A. Goldstein, teacher of photography.

Coming Conventions

Oct. 3. Association of Trade and Technical Administrators of New York State at Lake Placid, N. Y. Secretary, Dr. Edward M. Lane, Smith Technical High School, Syracuse, N. Y.

Oct. 22–23. Four State Regional Industrial Education Conference at Pittsburg, Kansas. Headquarters, Kansas State Teachers College. General chairman, Dr. J. V. Melton, Pittsburg, Kans.

Oct. 26–29. Virginia Vocation Association at Richmond, Va. Secretary, Robert F. Williams, 401 N. 9th St., Richmond 19, Va.

Nov. 28–Dec. 3. National Council of Local Administrators of Vocational Education and Practical Arts, at Milwaukee, Wis., in conjunction with the American Vocational Association. Secretary, Frank Huffaker, 215 Chestnut St., Chattanooga 3, Tenn.

Nov. 28–29. National Association of Industrial Teacher Trainers, at Milwaukee, Wis. Headquarters, Schroeder Hotel. Chairman, Dr. Harold Silvius, Wayne University, Detroit, Mich. Secretary, Prof. Thomas Diamond, University of Michigan, Ann Arbor, Mich.

Nov. 29–30. National Association of State Directors of Vocational Education, at Milwaukee, Wis. Headquarters, Schroeder Hotel. Chairman, Ernest J. Simon, 216 E. Monroe St., Springfield, Ill. Secretary, Harry C. Schmid, 488 Wabasha, St. Paul 2, Minn.

Nov. 29–Dec. 4. American Vocational Association at Milwaukee, Wis. Headquarters, Milwaukee Auditorium. Executive Secretary, L. H. Dennis, 1010 Vermont Ave., Washington 5, D. C. Local chairman, William J. Rasche, Milwaukee Vocational School, Milwaukee 3, Wis.

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Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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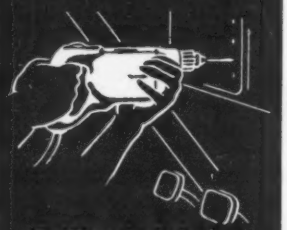

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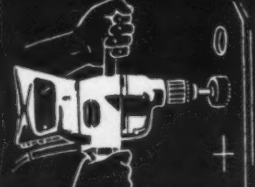

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Difficulties Encountered by Beginning Teachers

THOMAS DIAMOND
University of Michigan
Ann Arbor, Mich.

1. *Teaching is a trade by itself*

There are some teachers who fail to realize that the mere possession of skill in a trade does not qualify a person to teach the trade. The beginning teacher, therefore, must have brought to his attention that when he starts teaching, a new group of skills must be acquired. His success as a teacher depends, therefore, not on his trade skill alone but also upon the efficiency with which he uses effective methods of organizing and presenting his subject.

For example, the method one uses in presenting a lesson to a group of junior high school pupils is likely to differ from the method used with a mature group in an evening class. Again the extent to which a teacher has analyzed his subject with a view to determining the relative importance of its various parts, as well as to discover which specific parts are most suitable for a particular student or group of students, governs to some extent the effectiveness of his teaching. Similarly, many occasions arise in which a knowledge of the proper teaching procedure is just as important as a knowledge of the subject or trade.

In view of these facts it is important that the tradesman learn to recognize the fact that trade experience by itself is not the only consideration in the teaching of that trade.

2. *Trying to teach too much*

Beginning teachers frequently fail to realize that the ability to assimilate new subject matter varies with individuals. It is important, therefore, that they have brought to their attention the fact that the lessons they present to any students must be geared to their capacity to understand them. As a general rule, it is better to present a lesson in two or more parts rather than to teach it in one lesson, if by doing so it is too long for the interest span of the pupils or their ability to grasp it fully.

This fact should be before the teacher constantly as he analyzes his subject and prepares his lesson plans.

3. *Failing to complete each step in the lesson before presenting the next step*

A carefully prepared lesson is divided into steps which follow one another in logical order. Frequently, step 2 can be understood only in the light of step 1. Again, step 3 presumes that steps 1 and 2 have been mastered. It is important, therefore, that, in presenting a lesson, the teacher must be sure to complete each step before he proceeds to the next one. Failure to do this may cause the teacher to be embarrassed, as he is compelled to go back from time to time to pick up points which should have been emphasized earlier. This destroys the continuity of the lesson and tends to confuse the pupil.

4. *Failure to include all steps in the lesson*

It has been pointed out that each step in a lesson be presented in its proper order. It is just as important that the teacher assure himself that no steps are omitted from his presentation. If a teacher follows the practice of preparing and following lesson outlines this is less likely to occur since he has thought the lesson through and checks up on himself from his outline as he proceeds.

This caution applies particularly to a mechanic who is an expert in his trade. As an expert he is more likely to omit fundamental ideas which appear to him to be so self-evident that they are not worth speaking about. However, to the learner they may be fundamental principles that he must know if he is to understand what follows. As such it is imperative that they be given their proper place in the lesson regardless of how elementary they may appear to the teacher.

5. *Failure to provide enough time for the lesson*

If a lesson is sufficiently worth while to warrant including it in the course it should be given enough time to cover it adequately. The question of how much time should be devoted to it, naturally, varies with the lesson. In general, however, enough time has been devoted to it only when the teacher has assured himself that it is understood by those for whom it is intended. A lesson that is hurried is apt to be a poor one.

6. *Undertaking to teach a lesson under unsuitable conditions*

The success of a lesson depends to a large extent upon the conditions under which it is presented. If conditions are such as to distract the attention of the pupils the lesson will be relatively poor. For example, if a circus parade should be passing at the time the lesson is being given the attention of the pupils is sure to be divided. If there is considerable activity or commotion going on in the room or shop, these activities are sure to receive some attention from some pupils. If there is considerable noise in the vicinity, the attention to the lesson tends to wander.

Then, too, there is the matter of the comfort of the pupils to be considered. If each one is comfortably seated, conditions for teaching would be considered better than if a number of the pupils are compelled to stand around the edges of the group.

Does the teacher have all of his equipment, material, and illustrative devices conveniently at hand? If not, the lesson is interrupted at different points in order that he may secure what is lacking. This tends

to cause interest to drop and makes it necessary for the teacher to rebuild the interest to the point where it seems desirable to proceed.

7. *Failure to make clear to the students the application in life of the principles being taught*

Students will work more diligently and will understand more readily if they can see the use somewhere in life's activities for the principles being taught. For this reason the teacher should not fail to encourage the student's interest by pointing out where the subject matter included in the lesson applies in the affairs of everyday life. The more closely these applications lie within the experience of the pupils the more valuable they become.

8. *Failure to appreciate the relationship between the attitude of a student and his capacity to learn*

Frequently, beginning teachers fail to realize that the student learns more rapidly if he has the right attitude toward the teacher and the work of the class. If this attitude is to be developed he must see some real value in acquiring the knowledge or skill for his own use. Assignments should be made in such a manner as to convince the student the task is worth doing, not merely because the teacher requires it. In other words one of the jobs of teacher is to create within his students a desire to do the work because it has value to him or to someone else. When this condition prevails teaching becomes effective, while at the same time it becomes a pleasant experience for both teacher and student.

9. *Failure to make assignments clear to the student*

One of the most distressing experiences for a student results from finding himself in the position of not knowing specifically what is expected of him. Because of this the teacher must be certain that he states precisely what he wants in language that the particular students with whom he is working can understand. Then he must check after the assignment is made in order to assure himself that the student has grasped thoroughly what he is supposed to do. This check can be made by asking appropriate questions after the subject has been presented, or it may involve observation of the class by the teacher after the students have gone to work and are attempting to apply what they are supposed to have learned.

10. *Failure to keep up to date*

After a teacher has received his appointment there is a tendency on the part of some to assume that they have achieved their goal and are, therefore, entitled to a period of rest. Because of this they frequently forget that we are living in a changing world. Progress is being made in the field in which they are teaching, and the methods of teaching in common use are constantly being revised as a result of experience. New literature is being written, new materials are being discovered, and new methods of handling them are being developed.

If the teacher hopes to keep abreast of these changes it is imperative that he maintain close contact with the current literature in his field as well as with the latest practices in his subject-matter field and in the field of teaching techniques.

This means that he must be alert to observe where changes are taking place and be ready and willing to adapt himself to such changes in his teaching procedure as are suggested by what he observes.

In order that he may be in a position to do this he must read the current professional literature in his field. It will be helpful if he makes a practice of attending and taking an active part in professional meetings. Then, too, he will learn much by visiting other schools where work of a similar nature to his is being carried on. And finally, if he is a trade teacher, he will benefit from actually working in an industrial establishment at least one summer out of every three.

11. *Failure to have an objective clearly in mind*

There are some teachers who appear to feel that their sole responsibility is to keep their pupils quiet and busy. The pupils are permitted to make what they please, when they please, as long as they are occupied and are careful not to disturb the teacher. The teacher forgets that every experience the pupil has in school is intended to be used as a medium for teaching something.

Since it is believed that this general principle is sound it behooves each teacher to decide specifically what he hopes to teach and then to select carefully those experiences by means of which the pupil can learn more effectively.

In view of this the teacher must evaluate each project the pupil makes in light of his objectives. Does the project serve to provide the pupil with opportunities to learn what the teacher wishes him to learn? Or is it merely work? If it is the latter, there can be no justification for it in a school shop.

Therefore, every teacher should have definite objectives in mind and everything he does in his teaching should make some contribution to their attainment.

12. *Failure to check the effectiveness of teaching*

There are those who assume that the pupil has learned his lesson when the teacher has gone through the motions of teaching. The teacher demonstrates before the class, he may lecture, he may carry on a discussion, or he may follow any one or all of the many procedures commonly used by teachers when teaching. He may have taken great pains to cover every point in the lesson, and he may feel that he has presented them simply enough that every pupil has grasped what he hoped to convey. He has shown them how to do the job, and he has told them in meticulous detail.

In spite of all this effort he may find that some of the pupils have not grasped the points he hoped he had made clear. In other words, the teacher must keep in mind that *if the pupil has not learned, the teacher has not taught.*

It is important, therefore, that, when the teacher is through presenting a lesson, it is important that he check to find out if the pupils understand what he tried to convey to them. This may be done by some questions directed at members of the class, or it may take the form of a short written test in which the important points of the lesson are stressed. In either case, it must be kept clearly in mind that the intent is to discover the effectiveness of the teaching rather than to test the relative standing of the pupils.

Another method followed by some teachers after a demonstration may offer a suggestion. In this case, the teacher stands to one side after the pupils have gone to work. From his point of vantage the teacher observes how the pupils apply the principles or methods presented in the lesson. If the demonstration has been satisfactory, it is likely that most of the pupils will show evidence that they grasped the lesson as it was presented. However, it is almost certain that one or more will have difficulty in applying what they were supposed to have learned. When this becomes evident it provides the teacher with an opportunity to review the lesson with the few who need help and thus clarify the points that were missed in the original demonstration.

Do not assume that your pupils have learned merely because you think you have taught them. Check and find out. Don't become discouraged if you find that your efforts appear to have been in vain. Take it merely as a sign that you may have used the wrong approach and that it is your responsibility to decide upon a new approach and try it again. And if necessary, try it again and again.

13. *Assumption that some fundamentals are too elementary to be mentioned*

Teachers who are experts in their fields frequently assume that the fundamentals of their subjects are too elementary to discuss before their classes. Teachers of mathematics are likely to assume that even the least able students must know that $a + a = 2a$. Similarly, the teacher of machine-shop work neglects to assure himself that his pupils can read a scale. To him the task is so simple that he would be insulting the pupils if he attempted to discuss the matter with them. However, these fundamentals are basic and must be learned before one can go very far in either of these subjects.

Because of this it is important that each teacher must assure himself that his pupils are familiar with each step that precedes the more difficult one he proposes to teach. This is necessary since each new step can be understood only in light of those more elementary steps which have been learned earlier. If the pupils know what has preceded the current lesson the teacher may proceed with assurance that he is likely to be understood. If he finds that they do not have the necessary background he must see that they get it before he can proceed.

A teacher may use one of many methods in checking to see if the pupils are ready for the new lesson. Perhaps the most common is that of reviewing what has been covered previously before presenting the new lesson. This means that, when the teacher is preparing the lesson, he must make a list of what must be known if the new material is to be understood. Having done this the first step in the new lesson is that of checking to see that the pupils are ready for it.

14. *Assumption that the teacher must answer all questions*

There are some teachers who have gained the reputation of being able to answer any question related to their subject. The pupils rely on this so, when they encounter a problem, they apply immediately to the teacher for the answer. In many cases this results in a steady stream of pupils approaching the teacher with questions about their work.

There are those who consider this a healthy situation in a class. The pupils are purposefully busy; the teacher is busy every minute of the period; and the discipline in the class is perfect. However, it would seem that it should be the function of the teacher to stimulate thinking and to encourage the solving of problems.

If he is to achieve this it is believed that he should refrain from answering any questions until he has assured himself that the pupil has exhausted the possibilities of finding the answer for himself. Has he studied the assignment? Has he read his textbook? Has he consulted his notebook or the reference books? In short, has he made a real effort to discover the answer to the question he is asking? If he has done all of these things then the teacher may reason the matter out with him, he may stimulate his thinking by thought-provoking questions to the end that the pupil really discovers a method whereby he can work out the answer himself.

All of this because the teacher is expected to teach and not to set himself up as a ready reference.

Selected Safety Activities Performed by Industrial-Arts Teachers

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The information presented in this article is based on findings from a doctoral dissertation.[1] The purpose of this thesis was to make a scientific analysis of the activities performed by outstanding industrial-arts teachers throughout the United States to determine units of instruction for professional courses in undergraduate industrial-arts teacher education.

One hundred and sixty activities were identified which were concerned with the theory, organization, and presentation of instruction. These activities were then evaluated by 750 outstanding industrial-arts teachers throughout the United States to determine: (*a*) if they performed them in the course of their duties; (*b*) how important they considered each activity to be; (*c*) their evaluation of the significance of each activity as a unit in industrial-arts teacher education; and (*d*) if there were additional activities that should be added to the original list.

One phase of the study was to compare the evaluations from the 750 respondents, 80 in the group considered most outstanding by directors, supervisors, and professors who nominated teachers to participate, and 99 Detroit teachers taking part in the study.

The following table has been developed to show some of the significant data for 10 of the 160 activities which were concerned with school-shop safety. The original number assigned to the activity is given. When an activity is discussed reference is made to this number. See table on next page.

The first column (1) gives the rank order number for the activity. A major aim of the study was to rank the activities to ascertain those that should receive major or minor emphasis, and those that should be rejected as units of instruction in industrial-arts teacher education. A scientific analysis based on standard deviation units was used to place them in this order.

Column (2) gives the percentage of the total respondents who performed the activity. Column (3) gives the mean importance rating by total respondents; this was a five-point scale, one being least important and five being most important. Column 4 of this table gives the percentage of total respondents who indicated that the activity should be studied in the professional courses, for industrial-arts teacher education.

The directors, supervisors, and professors who furnished the names of outstanding teachers throughout the United States were asked to star one teacher on their lists whom they considered most outstanding. There were 80 people in this group. The percentage of starred teachers, performing

[1] G. Harold Silvius, *Instructional Units for Professional Courses in Undergraduate Industrial-Arts Teacher Education*. Doctoral dissertation (State College: Pennsylvania State College, 1946)
This dissertation may be borrowed through the inter-library loan service from the Pennsylvania State College. Microfilm of the complete manuscript, 486 pages, may be purchased from University Microfilms, Ann Arbor, Mich. ($6.08).

An Evaluation of Selected Activities of Industrial Arts Teachers Concerned With Safety Education	*Importance rank for activity in rank (1–160)*	*Total respondents* (750) *Per cent performing activity*	*Mean importance rating (1–5) scale*	*Per cent indicating activity should be taught in college*	*Per cent of starred teachers (80) performing activity*	*Per cent of Detroit teachers (99) performing activity*
	(1)	(2)	(3)	(4)	(5)	(6)
155. Keep shops clean and orderly....	6	96.1	4.7	80.8	91.3	96.0
83. Plan and maintain a safety program	13	83.9	4.4	87.2	77.6	91.9
144. Plan and provide an efficient system for storing materials.....	21	95.5	4.4	81.1	96.3	97.0
156. Secure proper lighting at work stations	23	87.3	4.4	78.5	91.3	84.9
158. Take precautions against fire (such as use of fire extinguisher or fire blanket)	26	87.7	4.5	74.5	90.0	83.8
159. Prepare shop or laboratory to be closed at end of school year....	31	96.1	4.3	69.3	93.8	97.0
64. Give first aid and care for an injured person.....	36	80.7	4.4	79.9	78.8	90.9
45. Record and report accidents.....	52	88.1	4.2	64.1	90.0	93.9
35. Construct and give safety tests...	72	62.8	4.0	82.7	57.5	72.7
66. Have students organized to participate in a fire drill.....	93	90.2	4.0	47.1	92.5	96.0

the selected safety activities is given in column (5).

Returns from the Detroit teachers participating in this study were compared with those from total respondents. Column (6) gives the percentage of Detroit teachers performing these selected activities.

Conclusions

The importance of keeping shops or laboratories clean and orderly was substantiated by the 750 teacher responses to activity 155; this activity had a mean importance rating of 4.7 and 96 per cent did it. These data also show that 80.8 per cent wanted it stressed in teacher education.

That the starred teachers, those noted as most outstanding in the study, did not perform activity 83, *Plan and Maintain a Safety Program,* to the degree that total respondents noted (—6.3 per cent) did it is an indication that the starred teachers were noted as being superior people on the basis of ability to present instruction. Throughout this study they appear to be slower to accept the newer practices in industrial arts. It was interesting to note that 91.9 per cent of Detroit teachers performed activity 83, *Plan and Maintain a Safety Program;* this was an increase of +8.0 per cent over total respondents. The emphasis in safety in Detroit schools would account for this increase.

The high percentage of performance for activity 144, *Plan and Provide an Efficient System for Storing Materials* by all respondents indicates its importance to successful teachers. Poor storage facilities create safety problems.

It was encouraging to find the starred teachers, those most outstanding, so concerned with activity 156, *Secure Proper Lighting at Work Stations;* 91.3 per cent indicated that they had provided proper lighting for work stations in their shops or laboratories.

Activity 158, *Take Precautions Against Fire,* was given a rank of 26, and Activity 159, *Prepare Shop or Laboratory to Be Closed at End of School Year,* a rank of 31 out of 160, when these activities were ranked for importance as topics for industrial-arts teacher education.

There were a number of comments written on check sheets for activity 64, *Give First Aid and Care for an Injured Person.* These were selected as typical:

We have a school nurse.
This is done by school nurse or doctor.
First aid only.
Done by clinic.

From data for activity 64, it would appear that approximately 15 per cent of the industrial-arts teachers are not called upon to give first aid. In most school shops, it still is an important function of the teacher, since 80.7 per cent of the total respondent gave first aid. This activity had a mean importance rating of 4.4 and 79.9 per cent

Eighty-one per cent of the industrial-arts teachers administer first aid. Photograph, courtesy of Jam Handy Organization

of total respondent expressed a desire to have it taught in college.

It was found that only 88.1 per cent of the teachers do activity 45, *Record and Report Accidents*. Activity 45 had a mean importance rating of 4.2. It would appear that teachers were primarily concerned with this activity as protection for the instructor from these comments that appeared for activity 45 on the check sheets:

> Yes, serious ones.
> Major ones.
> Only serious ones.

If the total respondents had recognized the values of recording all accidents with the objective of improving their safety instruction by teaching precautions to reduce the common accidents in school shops or laboratories, more than 64.1 per cent would want it taught in college. The increase for activity 45, (± 13.7 per cent) by Detroit teachers over total respondents was undoubtedly due to the emphasis that is placed on safety in Detroit school shops.

From data for activity 35, *Construct and Give Safety Tests*, it was apparent that teachers would like to see this topic emphasized in college. Only 62.1 per cent were using safety tests, but 82.7 per cent wanted this unit taught in college. One individual who was using safety tests wrote, "We give safety tests which are kept on file until students graduate. This shows that safety instruction has been given in case of accidents."

Activity 66, *Have Students Organized to Participate in a Fire Drill*, was done by 90.2 per cent of total respondents; however, only 47.1 per cent thought it needed to be stressed in teacher education, which accounts for its rank of 93 as a topic for industrial-arts teacher education.

Teachers should record all injuries to determine how common accidents may be prevented. Photograph, courtesy Jam Handy Organization

The Technical Institute in American Education

LEO F. SMITH
Chairman, Educational Research Office
Rochester Institute of Technology
Rochester, N. Y.

DONALD K. BECKLEY
Director, Prince School of Retailing
Simmons College
Boston, Mass.

The tremendous increase in applications for admission to all institutions of higher education in the United States has once again emphasized the need for additional facilities at the post-high school level. Dr. Conant, president of Harvard University, in his last annual report to the board of overseers pointed out one way in which this need might be met.

"As someone has remarked, education is contagious; one of the consequences of the present influx of veterans into our colleges and universities will be a demand for the younger brothers and relatives to have similar opportunities. That there will be an increase in the numbers who desire an education beyond the high school as compared with the prewar years is almost certain. . . . For many types of students a terminal two-year education beyond the high school, provided locally, seems better adapted to their needs than that offered by a traditional four-year residential college. The difference in cost between the two, of course, is very large. Many who have studied the problem intensively feel that the further demands for advanced education should be met largely by the rapid expansion and development of such terminal two-year colleges."

This statement and others of a similar nature which have appeared in increasing numbers in recent months emphasize the technical institute as an extremely valuable source of education for American youth. The fact that the technical institute has not generally been widely publicized makes all the more necessary a survey of the background and present status of the technical institute in American education. It is the purpose of this article to point out some of the unique characteristics of these institutions.

What Is a Technical Institute?

In surveying the field of the technical institute, it is first necessary to agree on a definition of this type of educational institution. In a thorough investigation in this field carried out under the direction of the Society for the Promotion of Engineering Education and published in 1931 as *A Study of the Technical Institutes*, the distinctive characteristics of the technical in-

stitute were summarized as a step in finding a suitable definition. The more significant of these are as follows:[1]

"It is a school of post-secondary character, but distinct in character from a college or university in the American sense. . . . Its purpose is to train men and women for callings and functions which occupy an area between the skilled crafts and the highly scientific professions. . . . It offers training for both technical pursuits, concerned with planning and control, and supervisory pursuits, concerned with operation and maintenance . . . (with emphasis on the latter group). Its entire scheme of instruction follows much more closely the actual usage of industry than that of professional engineering schools."

"As the courses of the technical institutes have no uniform standards of length, a somewhat arbitrary criterion was chosen for the purposes of this study which included only those offering the equivalent of at least one full academic year of post-secondary work."

More recently, a subcommittee on engineering schools of the Engineers' Council for Professional Development, completed a study of the possibility of some form of accreditation for technical institutes, and in recommending that some form of accreditation be initiated, drew up the following definition:[2]

"Curricula to be considered are technological in nature and lie in the post-high school area. They differ in content and purpose from those of the vocational school on one hand and from those of the engineering college on the other. Currricula in this field are offered by a variety of institutions and cover a considerable range as to duration and content of subject matter, but have in common the following purposes and characteristics:

"1. The purpose is to prepare individuals for positions auxiliary to, but not in, the field of professional engineering.

"2. Curricula are essentially technological in nature. . . .

"3. Curricula are briefer, more intensive, and more specific in purpose than collegiate engineering curricula, although they lie in the same general fields of industry and engineering. Their aim is to prepare individuals for specific technical positions or lines of activity rather than for broad sectors of engineering practice.

"4. Training for artisanship is not included within the scope of education of technical institute type.

"5. High School graduation or the equivalent is required for admission."

The two quotations above represent an approach to a definition of a technical institute primarily from an engineering viewpoint. Both of these definitions have been widely criticized by technical institute administrators who point out that their institutions are concerned more with an area of service rather than a level which is "intermediate," or "an area between the skilled crafts and the highly scientific professions." Studies of technical institute graduates reveal that they assume positions of responsibility in supervisory, sales and service, construction and maintenance, and design and research occupations. Likewise, many of the technical institutes offer curricula in agriculture, graphic arts, health services, and home economics which are integral parts of these institutions but which cannot be classified under the foregoing definition. Because of these facts it is believed that the objections are well founded.

[1] "A Study of Technical Institutes," Society for the Promotion of Engineering Education, 1931, pp. 17–18.

[2] "Accredited Technical Institute Curricula," Reprint from 14th Annual Report, Oct. 19, 1946, ECPD, New York, p. 7.

The Development of the Technical Institute

There is no readily traceable pattern of growth of the technical institute in the United States. Actually, each institute seems to have grown up as a result of a particular local training need or because of the educational vision of some individual, with little common development of aims in conjunction with other comparable schools.

In one respect, however, the development of technical institutes has closely paralleled that in Great Britain. Early in the 1820's, mechanics' institutes were established in the principal cities, and schools were created to aid in disseminating scientific information among farmers and mechanics. The Ohio Mechanics Institute, Cincinnati, Ohio, which opened in 1828, was the only one of this early group which evolved directly into the type of institute being discussed here. The Rochester Institute of Technology (until 1944 named the Rochester Athenaeum and Mechanics Institute) traces its history back to 1829 and has developed from a consolidation of the Athenaeum and the mechanics' institute.

There were many other mechanics' institutes and other schools filling similar functions a century ago, but most of the institutions which in the early years performed the function of technical institutes either discontinued operation or were led to abandon this field and to become conventional four-year engineering colleges. Examples of institutes which successfully made this transformation are the Polytechnic Institute of Brooklyn, opened in 1855, which has been collegiate since 1889; and the Drexel Institute of Technology, founded in 1891 and made degree granting in 1915. Carnegie Institute of Technology and Michigan State College are among the other institutions which have become degree granting either in whole or in part.

Why was the technical institute function so generally abandoned? A fundamental reason was that this country had no philosophy of technical education to lend support to any variations from the accustomed educational pattern. The college had arrived first on our educational scene, and a considerable prestige had been built up around it. The desire for a degree and for the social distinction which affiliation with a college or university presumably provided was a significant factor to students in deciding against the technical institute if a choice were offered. As universities set up engineering courses, and as vocational courses came into the high schools, it was widely thought — erroneously, as now seems clear — that there was no general need for the function the technical institute performed. Many institute administrators and faculties, students and graduates, as well as professional societies and some industries were in rather wide agreement that college or professional school status was far more suitable for their own purposes than the technical institute, and generally ignored the fact that there was a special area — far larger now than earlier — for which training can be far more adequately provided in the technical institute than in other institutions thus far developed.

Present Status of the Technical Institute

The intensive study published in 1931 by the SPEE provided the only data on the status of the technical institute in American education until an annual survey of technical institutes was initiated in 1945 by one of the present writers. Since 1945, an annual survey has been made and published by the McGraw-Hill Book Company in their *Technical Education News*. In this survey, the definition of a technical institute used is that developed by the Engineers' Council for Professional Development, (see quotation referred to in footnote 2), although the need for an improved definition is pointed out. Data in this compilation was secured largely by questionnaire and letter, most of the institutions which replied indicating that they had some form of program roughly comparable to that stated in the definition. No attempt was made to indicate the total number of technical institutes, for even with a detailed definition with which to work, there are many borderline cases in which it is difficult to determine without a personal survey whether or not the institution meets the stated requirements. However, it is clear that a much larger number of technical institutes were located than in the SPEE 1931 survey, in which only 14 such programs were found. This evidence does not

necessarily mean that the number of technical institutes has increased so rapidly — although there have been many set up during the war years — but that so few have hitherto been identified in any report.

The total enrollment of technical institutes reporting for the school years 1944–45[3] and 1945–46[4] was found to be 3249 and 8520 respectively.

It should be noted that technical institutes suffered even more heavily during the war than might have been anticipated in view of the nature of their offerings. Aside from the general effects of the war on enrollments, a major reason for this decline lies in the fact that since little reliable information was available at the beginning of the war regarding technical institutes, scant use was made of these schools in army or navy training — much of which was of the type these institutions had been offering for years.

The principal categories of technical institutes identified in the Smith survey are as follows:

State and Municipal Technical Institutes. Since 1895 Massachusetts has had two state textile schools at Fall River and New Bedford which offer two- and three-year diploma courses in the textile technology field. New York State for some years has had a system of six agricultural and technical institutes, and is embarking on an expanded program which will be discussed in a succeeding section of this paper. The California Polytechnical School at San Luis Obispo offers two-year vocational courses, three-year technical courses, and four-year degree courses in both agricultural and industrial areas. In Indiana, Purdue University has inaugurated a Division of Technical Institutes in the Gary-Hammond, Ft. Wayne, and Indianapolis areas. Likewise, some of the technical schools in Connecticut are now becoming technical institutes.

Privately Endowed Technical Institutes. There are only a few of these institutions but some outstanding contributions have been made by members of this group to educational philosophy and practices. Franklin Technical Institute in Boston was built and equipped with funds accruing from a legacy left by Benjamin Franklin. Two-year courses in industrial mechanics, industrial chemistry, industrial electricity, and mechanical technology are offered. In addition, a one-year technical orientation course is offered. Wentworth Institute, also in Boston, offers two-year day programs in machine construction and tool design; electrical construction; steam and diesel engineering; patternmaking and machine design; machine work and toolmaking; architectural and building construction; aircraft maintenance engineering and industrial electronics. The Rochester Institute of Technology has for 25 years been a leader in the co-operative education movement and in the techniques of curriculum construction. Co-operative programs in industrial chemistry, electrical, mechanical, food administration and retailing areas, and full-time programs in photographic technology, publishing and printing, and applied art are offered.

Proprietary Technical Institutes. There is a wide variety of programs offered in institutions in this category. The Bliss Electrical School in Washington, D. C., has since 1893 been offering intensive courses in the electrical field. The Bowman Technical School, Capitol Radio Engineering Institute, Chicago Technical College, Milwaukee College of Engineering, R.C.A. Institutes, and Cal-Aero Technical Institute (formerly the Curtiss-Wright Technical Institute) are some of the other well-known schools. The National Council of Technical Schools, which is an organization composed primarily of proprietary institutes, has been formed to raise the standards and bring some order out of the confusion which has existed in this field. Interestingly enough, two well-known proprietary institutes, Parks Air College and Hancock College of Aeronautics, have now become the colleges of aeronautics of St. Louis University and the University of Southern California, respectively.

YMCA Schools. The Dayton YMCA College, Dayton, Ohio; Multnomah College, Portland, Oregon; and Washington Technical Institute in Seattle, Washington, were the only schools reporting enrollments in the 1946 annual survey of technical institutes.

State Maritime Academies and Federal Schools. There are a number of state maritime academies and federal schools which fall into the technical institute category, but these programs will not be described in this article.

Curriculums Offered in Technical Institutes

In a survey[5] conducted in January, 1946,

[3]Smith, Leo F., "A Survey of Technical Institutes," *Technical Education News*, June, 1945.
[4]Smith, Leo F., "Annual Survey of Technical Institutes," *Technical Education News*, June, 1946.
[5]Smith, Leo F., "Technical Institute Curriculums," *Technical Education News*, Oct., 1946.

TABLE 1
Types and Number of Curriculums Offered in Technical Institutes, 1945–46

Curriculum	*Number of institutions offering curriculum*
Agriculture	
Agriculture	7
Inspection and mechanics	1
Crops production	1
Dairy mfg. and production	2
Fruit production	1
Meat animal husbandry	1
Ornamental horticulture	2
Poultry production	1
Total	16
Engineering and technology	
Aviation	31
Air conditioning and refrigeration	7
Auto mechanics	3
Building trades	11
Chemistry, industrial	6
Chemistry, textile	2
Civil and structural	3
Drafting and design	6
Electricity, industrial	15
Industrial	3
Machine shop and construction	7
Mathematics	2
Mechanical	10
Patternmaking and woodworking	4
Radio and electronics	21
Steam and diesel	1
Supervision and production	1
Textile	3
General and miscellaneous	2
Total	138
Graphic arts	
Applied art	3
Photographic technology	1
Printing and publishing	2
Total	6
Health services	
Laboratory technology	1
Practical nursing	1
Pharmacy	1
Total	3
Home economics	4
Total	4
Miscellaneous	
Beauty culture	1
Costume design	1
Ceramics	1
Food administration	1
Commercial	1
Engraving	1
Jewelry and watchmaking	3
Piano technician	1
Plastics	1
Oil burner maintenance	1
Retail distribution	1
Total	13
Grand total	180

it was found that a variety of types of curriculums were offered in technical institutes. Table I lists these curriculums in agriculture, engineering and technology, graphic arts, health services, home economics, and miscellaneous areas.

It can be seen that although technical institute offerings are primarily in the various technical and engineering fields, there are a variety of other areas of training included.

The Growth of Technical Institutes

Although industry requires an average of 5.2 technicians for every engineer,[6] the technical institutes have not grown in number and size correspondingly to meet this need. What is the explanation? The authors believe the following conditions have limited the growth:

1. For the most part, the American public has been accustomed to the elementary, secondary, and college sequence of training. The technical institute does not readily fit into this pattern and is sometimes viewed with misgivings by parents and prospective students.

2. Most of the technical institutes have been pioneering institutions, and it has been difficult for the general public to visualize the place of the technical institute in the scheme of education. In this connection, there has been little material published in standard educational journals concerning the field of the technical institute.

3. The provision of terminal courses in junior colleges has fulfilled in part a need comparable to that being served by the technical institutes.

4. The relatively high cost of education in the technical institute as compared with the publicly supported junior college or state university.

5. The technical institutes have likewise been handicapped because of the fact that their graduates do not receive a diploma, certificate, or degree which is nationally recognized.

To many people the degree is still the symbol of academic achievement. Prospective students contemplating attendance at a technical institute are sometimes deterred because of a fear that in addition to its supposed social implications, lack of a degree will prove a handicap in rising to higher positions after they begin work. That the problem of a degree is not as serious as perhaps contemplated is indicated in part by the results of a survey[7] made by the supervisor of the electrical department at the Rochester Institute of Technology. Of 394 men who had been graduated from the three-year co-operative electrical course during the years 1925–36, the largest single group were in engineering design and research jobs (18 per cent); construction and maintenance accounted for the next largest group (12.3 per cent); industrial processing (11.9 per cent); sales and service (9.6 per cent); and power generation; supervision; drafting; teaching; and owner of own business accounted for smaller numbers. Only 15.5 per cent had left the field for which trained and no information was available on 9.6 per cent. In the SPEE study, which has already been referred to, the three largest groups of technical institute graduates were supervisors, engineering personnel, and proprietors of businesses, respectively. At the time the study was made 90 per cent reported they would go to the same type of school if they had it to do over again. In light of the foregoing, it seems likely that much of the fear of lack of success without a degree is psychological.

New Institutes in New York State

Following the Regents' Inquiry, in 1938, in which attention was called to the need for additional schooling beyond the twelfth grade in terms of both cultural courses and subprofessional training, a commission was set up to study the problem, and their findings incorporated into a booklet *Regents Plan for Postwar Education in the State of New York*. The purpose of these institutes as stated in this report is as follows:[8]

"The institutions will . . . be charged with the multiple task of combining technical training with a general education. . . . In New York State not all of the boys and girls desiring some form of higher education can be taken care of by assigning them to teachers colleges, agricultural schools, or private colleges, as at present organized. . . . It is therefore recommended that there be established Institutes of Applied Arts and Sciences having as their principal objective the preparation of young men and women for positions technical and semi-professional in character. The curriculums will include:

"1. A basic preparation for selected arts, technologies, and subprofessions which require a technical proficiency not reached in high school programs. Some of the indicated occupations are those of: draftsman, electrical technician, store operator, dietitian, radio technician, workers in hospitals, and in building, automotive, aviation and photographic services. . . .

"2. Related offerings in arts and sciences.

"3. Personal and civic arts designed to further the general welfare and understanding of the students."

In March, 1946, the New York legislature passed, and Governor Dewey signed, the bill creating five new institutes of applied arts and sciences. These institutes are to be located at Binghamton, Buffalo, New York City, Utica, and White Plains. These institutions are to have two-year programs with high school graduation or its equivalent required for admission. In addition, there will be evening classes, and in some instances, co-operative part-time programs as well.

The Future of the Technical Institute

Surveys by the American Youth Commission (1940), the Commission of Terminal Education of the American Association of Junior Colleges (1940), the National Resources Planning Board (1943), in addition to the statement of Dr. Conant's quoted at the beginning of this article, have emphasized the need for technical education at this level.

Clearly, there is an important place for the technical institute, and a function which this institution can perform better than any other type of institution thus far developed. Growth of technical institutes seems assured provided the public can come to recognize more fully the unique function of these institutions in American education.

[6] "Vocational-Technical Training for Industrial Occupations," Vocational Division Bulletin, No. 228, U. S. Gov't. Printing Office, 1944, p. 22.

[7] Ellingson, Mark, and Smith, Leo F., "Technical Institute Graduate's Place in American Industry," *Technical Education News*, Jan., 1945, p. 15.

[8] "Regents Plan for Postwar Education in the State of New York," The University of the State of New York, Albany, 1944, pp. 13–14.

Guarding Woodworking Machinery*

C. SMITHEY SHULTS
Rock Springs, Wyo.

One of the major problems confronting the safety movement has been the failure to prevent accidents in small business shops, community hobby or craft centers, repair and maintenance shops, home workshops, and, to a certain extent, in school and vocational shops. In all of such shops, great numbers of unguarded or poorly guarded machines are in use. Many of these power tools are old. They were made before their builders had designed guards. Some were purchased without guards be-

*Address given at the American Industrial Arts Association Convention, at Washington, D. C., May 6, 1948.

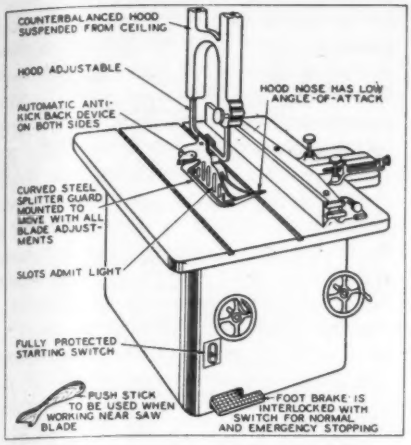
COUNTERBALANCED HOOD SUSPENDED FROM CEILING
HOOD ADJUSTABLE
AUTOMATIC ANTI-KICK BACK DEVICE ON BOTH SIDES
HOOD NOSE HAS LOW ANGLE-OF-ATTACK
CURVED STEEL SPLITTER GUARD MOUNTED TO MOVE WITH ALL BLADE ADJUSTMENTS
SLOTS ADMIT LIGHT
FULLY PROTECTED STARTING SWITCH
PUSH STICK TO BE USED WHEN WORKING NEAR SAW BLADE
FOOT BRAKE IS INTERLOCKED WITH SWITCH FOR NORMAL AND EMERGENCY STOPPING

Fig. 1. An adequately guarded circular saw

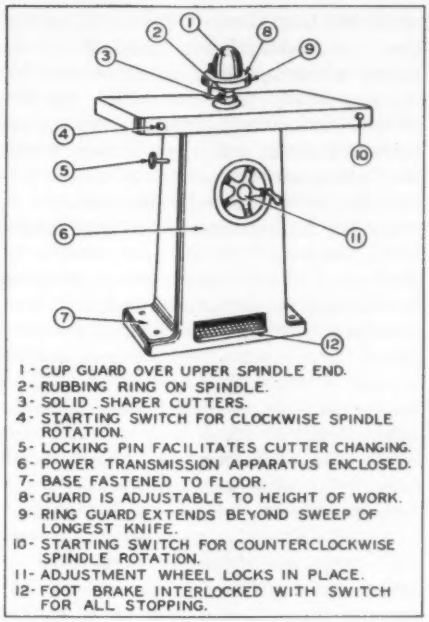
1 - CUP GUARD OVER UPPER SPINDLE END.
2 - RUBBING RING ON SPINDLE.
3 - SOLID SHAPER CUTTERS.
4 - STARTING SWITCH FOR CLOCKWISE SPINDLE ROTATION.
5 - LOCKING PIN FACILITATES CUTTER CHANGING.
6 - POWER TRANSMISSION APPARATUS ENCLOSED.
7 - BASE FASTENED TO FLOOR.
8 - GUARD IS ADJUSTABLE TO HEIGHT OF WORK.
9 - RING GUARD EXTENDS BEYOND SWEEP OF LONGEST KNIFE.
10 - STARTING SWITCH FOR COUNTERCLOCKWISE SPINDLE ROTATION.
11 - ADJUSTMENT WHEEL LOCKS IN PLACE.
12 - FOOT BRAKE INTERLOCKED WITH SWITCH FOR ALL STOPPING.

Fig. 2. An adequately guarded shaper

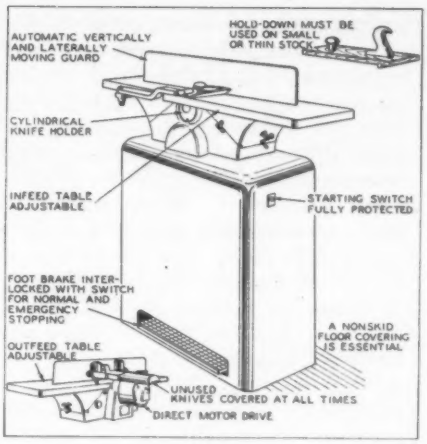
AUTOMATIC VERTICALLY AND LATERALLY MOVING GUARD
HOLD-DOWN MUST BE USED ON SMALL OR THIN STOCK
CYLINDRICAL KNIFE HOLDER
INFEED TABLE ADJUSTABLE
STARTING SWITCH FULLY PROTECTED
FOOT BRAKE INTERLOCKED WITH SWITCH FOR NORMAL AND EMERGENCY STOPPING
A NONSKID FLOOR COVERING IS ESSENTIAL
OUTFEED TABLE ADJUSTABLE
UNUSED KNIVES COVERED AT ALL TIMES
DIRECT MOTOR DRIVE

Fig. 4. An adequately guarded jointer

cause of price considerations. Others have homemade guards, but many are completely unguarded.

All available figures show conclusively that woodworking and metalworking machines are responsible for at least one third of all industrial accidents. Such figures as are available show that this accident rate is kept high principally because of the frequency of injuries in the small types of shops which use unguarded machines. If each of these dangerous machines could be properly safeguarded, the accident toll which is now so high in small shops would be greatly reduced.

At the present time, some of the finest machines available are equipped with guarding devices which are makeshift, cumbersome, and often inadequate. Because of special accessories which increase the number of operations possible, the guarding provided is often so limited as to be nearly useless.

With all deference to the efforts of the National Safety Council, which has worked out a fine set of minimum guarding requirements for woodworking machines, it would be well for school shops to consider the inclusion of more explicit, more complete safeguarding standards. Minimum or essential safeguarding is a notable step forward, yet it is only a compromise. Unless protection to the machine operator is adequate or complete, the goal is not achieved.

Included in this article are seven illustrations. Each one concerns one of the more commonly used types of woodworking machines: the circular or table saw, the smaller type of shaper, a small band saw, an ordinary jointer, a tool grinder, a small drill press, and a woodworking lathe.

Guarding devices on power tools may be classified in two groups: those covering point-of-operation hazards, and those covering belts, pulleys, and other moving parts.

Guarding for the latter group is generally being included in the design of many present-day machines by the builders. In the drawings, point-of-operation guarding devices are emphasized.

Figure 1 concerns recommendations for adequately guarding the circular saw. Features which should be incorporated on every machine are an adjustable, counterbalanced hood, slotted for better visibility; the hood nose should have a low angle-of-attack, and be adaptable for use with any degree of tilt required of the saw or table; an automatic antikickback device of sufficient strength and length; curved steel splitter guard mounted to move with all

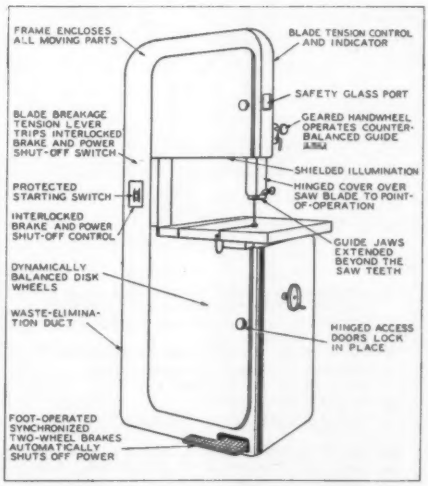
FRAME ENCLOSES ALL MOVING PARTS
BLADE TENSION CONTROL AND INDICATOR
SAFETY GLASS PORT
BLADE BREAKAGE TENSION LEVER TRIPS INTERLOCKED BRAKE AND POWER SHUT-OFF SWITCH
GEARED HANDWHEEL OPERATES COUNTER-BALANCED GUIDE
SHIELDED ILLUMINATION
PROTECTED STARTING SWITCH
HINGED COVER OVER SAW BLADE TO POINT-OF-OPERATION
INTERLOCKED BRAKE AND POWER SHUT-OFF CONTROL
GUIDE JAWS EXTENDED BEYOND THE SAW TEETH
DYNAMICALLY BALANCED DISK WHEELS
WASTE-ELIMINATION DUCT
HINGED ACCESS DOORS LOCK IN PLACE
FOOT-OPERATED SYNCHRONIZED TWO-WHEEL BRAKES AUTOMATICALLY SHUTS OFF POWER

Fig. 3. An adequately guarded band saw

blade adjustments. If it were possible for the splitter guard to conform to the varying dimensions of all saw blades, which can be used on a given saw, binding prevention could be complete. Furthermore, as on all other machines, the starting switch must be fully protected, so that unintentional starting is impossible. Also a convenient foot brake should be interlocked with a switch for normal and emergency stopping. These devices could be made standard on all circular saws.

Figure 2 shows recommendations for adequately guarding shapers. Only a few of the guards available on today's market cover the entire range of shaper operations. This hazardous machine should have a cup guard over the upper spindle end; a rubbing ring on the spindle shaft; solid shaper cutters; separate starting switches for clockwise and counterclockwise rotation; a locking pin to facilitate cutter changing; a ring guard which extends beyond the sweep of the longest knife of the cutter head; an adjustment wheel which locks in place; a foot brake which is interlocked with a switch for all stopping. The ring and cup guard assembly should be adjustable to the height of the work, and the power transmission apparatus should be completely inclosed in a wide base stand which is fastened to the floor. Of course, a nonskid floor covering around the machine should be required. In almost all cases, shaper guards must be purchased separately, at extra cost. An effort should be made to standardize the most efficient safety devices and include them in the purchase price.

An adequately guarded band saw, as shown in Figure 3, should include these features: a strong frame which encloses all moving parts; a tension control device which, in case of blade failure, snaps back and automatically trips the interlocking braking and power shut-off system, a pro-

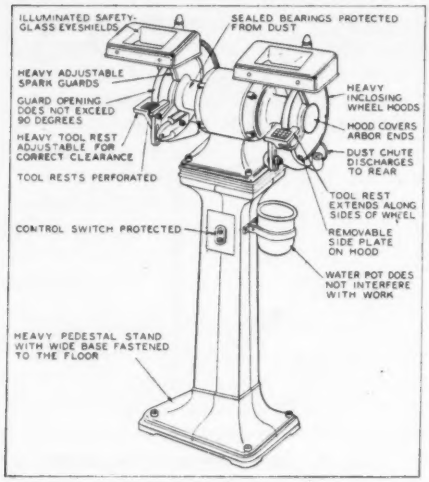
ILLUMINATED SAFETY-GLASS EYESHIELDS
SEALED BEARINGS PROTECTED FROM DUST
HEAVY ADJUSTABLE SPARK GUARDS
GUARD OPENING DOES NOT EXCEED 90 DEGREES
HEAVY TOOL REST ADJUSTABLE FOR CORRECT CLEARANCE
TOOL RESTS PERFORATED
CONTROL SWITCH PROTECTED
HEAVY PEDESTAL STAND WITH WIDE BASE FASTENED TO THE FLOOR
HEAVY INCLOSING WHEEL HOODS
HOOD COVERS ARBOR ENDS
DUST CHUTE DISCHARGES TO REAR
TOOL REST EXTENDS ALONG SIDES OF WHEEL
REMOVABLE SIDE PLATE ON HOOD
WATER POT DOES NOT INTERFERE WITH WORK

Fig. 5. An adequately guarded grinder

tected switch used for starting only, brakes which are interlocked with the power shut-off for normal and emergency stopping; an adequate waste or dust elimination system; dynamically balanced disk wheels; synchronized two-wheel, foot-operated brakes, which automatically shut off power in normal stopping; a spring tension lever and indicator to show proper saw tension; a safety glass port to allow checking and adjusting tracking of the blade; a geared hand wheel to operate the counterbalanced guide arm; shielded illumination for point of operation; a hinged cover for the sliding guide arm, which covers the saw blade down to the point of operation; the guide jaws should extend at least ¼ in. past the saw teeth, and hinged access doors which lock in place will make blade changing an easy operation. Certain modern band saws include, *among* them, every one of these features. They could be made standard on all machines.

All adequately guarded jointers, as shown in Figure 4, would include an automatic guard, which moves vertically and laterally to cover the used portion of the knives at all times, a cylindrical knife holder or head, adjustable infeed and outfeed tables, a fully protected starting switch, a shield or cover for the unused portions of the knives, a direct motor drive, and a foot brake which is interlocked with a switch for normal and emergency stopping. Moreover, dogs, cams, or other such antikickback devices with sharp enough teeth to dig into hard wood should be installed in the face of the guard or at the base of the fence. The machine builders should furnish instructions on the construction of hold-downs, push sticks and jigs which can be used for short pieces of material.

An efficiently guarded tool grinder, shown in Figure 5, should have sealed bearings protected from dust; illuminated safety glass eye shields; heavy adjustable spark guards whose openings do not exceed 90 degrees; heavy tool rests which are adjustable for correct clearance, extending backward along both sides of each wheel and which are perforated to reduce rebounding of sparks and flying particles; a protected control switch; a dust chute which discharges to the rear, preferably through a filter; heavy wheel-enclosing hoods which cover the arbor ends and have removable side plates for changing grinding wheels; and a water pot which is located so that it won't interfere with work. The whole assembly should be mounted on a heavy pedestal stand with a wide base which is to be fastened to the floor. Complete instructions on the proper selection, care, and use of abrasive wheels should be furnished with each such wheel sold. Power-tool companies should be encouraged to include more and more of these safety features as standard equipment on all models instead of having them, as usual, "available at extra cost."

Figure 6 shows a drill press which is but slightly different from one of the newest on the market today. The addition of most of its safety features is undoubtedly the result of the widespread use of drill presses during the recent war. Built-in guarding should include a combination hood and head shield to enclose completely all power transmission apparatus, with the hood side hinged to make the belt easily accessible; the elimination of projecting bolt heads; adding ball ends to all levers; completely

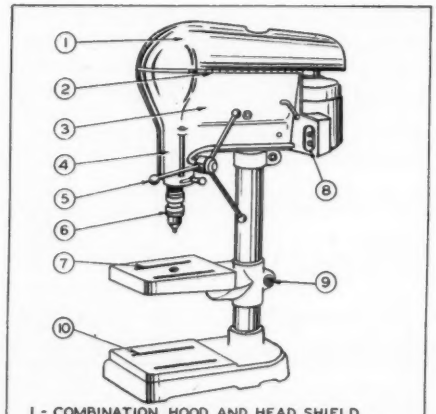
1 - COMBINATION HOOD AND HEAD SHIELD COVERS POWER TRANSMISSION APPARATUS.
2 - HOOD SIDE HINGED FOR COMPLETE BELT ACCESSIBILITY.
3 - PROJECTING BOLT HEADS ELIMINATED.
4 - SPINDLE COMPLETELY ENCLOSED.
5 - BALL ENDS ON LEVERS.
6 - SAFETY TYPE CHUCK.
7 - TABLES SLOTTED TO FACILITATE CLAMPING STOCK.
8 - SWITCH FULLY PROTECTED.
9 - POSITIVE CLAMPING OF ADJUSTABLE TABLE.
10 - BASE FASTENED SECURELY TO BENCH.

Fig. 6. An adequately guarded drill press

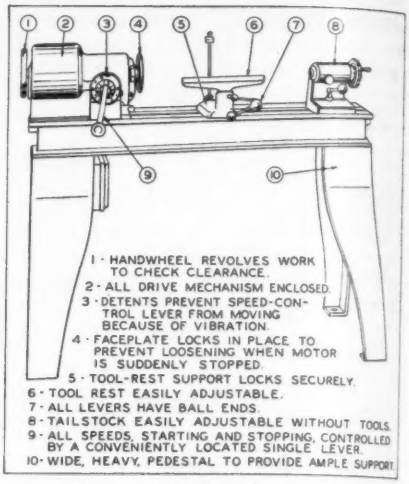
1 - HANDWHEEL REVOLVES WORK TO CHECK CLEARANCE.
2 - ALL DRIVE MECHANISM ENCLOSED.
3 - DETENTS PREVENT SPEED-CONTROL LEVER FROM MOVING BECAUSE OF VIBRATION.
4 - FACEPLATE LOCKS IN PLACE TO PREVENT LOOSENING WHEN MOTOR IS SUDDENLY STOPPED.
5 - TOOL-REST SUPPORT LOCKS SECURELY.
6 - TOOL REST EASILY ADJUSTABLE.
7 - ALL LEVERS HAVE BALL ENDS.
8 - TAILSTOCK EASILY ADJUSTABLE WITHOUT TOOLS.
9 - ALL SPEEDS, STARTING AND STOPPING, CONTROLLED BY A CONVENIENTLY LOCATED SINGLE LEVER.
10 - WIDE, HEAVY, PEDESTAL TO PROVIDE AMPLE SUPPORT.

Fig. 7. Adequately guarded lathe

enclosing the spindle; the use of a safety-type chuck; fully protected switch; positive clamping of the adjustable table; both tables slotted to facilitate clamping of the stock, *and* making it possible to fasten the base to a bench. At present, clamps and belt shields must be purchased at extra cost. Standardizing this equipment on all drill presses for sale would greatly reduce accident possibilities.

Figure 7 shows an adequately guarded woodworking lathe, whose safety features are found on several of the machines for sale at the present time, but *not* on a lot of the obsolete equipment in use in many small shops. This lathe has a large hand wheel for revolving the work to check clearances; the drive mechanism is completely enclosed; detents or a locking device prevents the speed control lever from moving because of vibration; the faceplate locks in place to prevent loosening when the motor is suddenly stopped; the tool rest support locks securely, yet is easily adjustable; all levers have ball ends; the tail stock is easily adjustable without tools; all speeds, starting and stopping, are controlled by a single convenient lever; and the machine is set on a heavy, wide pedestal which may be fastened to the floor.

Surely it is not necessary to repeat to shop teachers the urgent reasons for eliminating hazardous old equipment or for initiating procedures which will secure compliance with higher safety standards. The method of attacking this problem should be twofold, and of course, long range. First, as many present or potential users of power machinery as possible should be reached through the schools and vocational training shops of the country. Standards for purchasing and inspecting machines should be set up and made available to all schools which maintain shops, as well as to small

businesses, community craft shops, and all individual users of these types of power tools. Designs, such as those shown in this article, should be worked out for all common types of woodworking and metalworking machines. Check sheets or inspection sheets and questionnaires could be made from them. It might even be possible for an organization such as the National Safety Council to have certain people inspect all school shops in a given state and tabulate the results of this survey. Educating the consumer to demand safer machines may be difficult, but it is the most effective manner of working on the builders of power machinery.

As a second phase of the attack, manufacturers of machine tools should be encouraged to conform to these higher standards. Builders of machine tools have been slow to respond to the increased emphasis on safety, as is shown by the practice, still general, of building a machine, and then designing safeguarding devices as an afterthought. Though some manufacturing houses have added many safeguards which were entirely absent a few years ago, great possibilities for improvement still exist. Devices which protect the operators should be built into the machines wherever possible. When separate installations must be provided to achieve complete guarding, they should be included as standard equipment. The practice of building guards for sale at extra and sometimes prohibitive cost should be condemned.

Present trends indicate that designers and builders of woodworking and metalworking machines are responding with more or less eagerness to the pressure exerted by safety groups. A higher quality of workmanship is evident on many safeguarding devices. More competent designers are being employed to devise better guarding methods. On a few types of machinery, safeguarding is an integral part of the design. Instead of being satisfied with these results, we should set our standards higher and give our approval to those concerns which *are* responding. Perhaps the American Industrial Arts Association could set up an institute which would examine and test safeguarded machines and issue a seal of approval for those which conform to its standards.

Certainly the time is at hand to devise a specific, yet impartial, method of discriminating, comparing, and evaluating, in terms of safety, the equipment on the market in this field by adopting standards which will be valuable to both the builders and users of the more common types of woodworking and metalworking machines.

Some Leaders in Industrial Education

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Lorenzo Dow Harvey – (Concluded)

(Continued from page 267 of the September, 1948, issue)

Extension Work for Teachers

An important type of pioneering work inaugurated by Dr. Harvey was extension courses for teachers in service. Normal schools had been in operation in Wisconsin for 25 years or more at the time Harvey became president of the Milwaukee Normal School, nevertheless there were thousands of teachers in the public schools who had never had any special preparation for the work of teaching, except, possibly, the more or less superficial coaching in teachers' institutes. Many persons entered upon teaching through the relatively simple procedure of acquiring certificates.

To offer something that would help to a better understanding of the work of the teacher, Harvey personally inaugurated a program of extension work. In 1893, he organized classes in two cities, composed of teachers and principals. The classes met every two weeks, on Saturdays, to discuss the subjects of attention, habit formation, will training, and other problems of applied psychology. The aim was to stimulate teachers to professional reading and thought on the application of psychological principles to the everyday situations of the schoolroom, and to awaken such an interest in the subject as would lead to further study and observation of the essential nature of the work of teaching.

He prepared an outline of the work to be done in the course, with references to guide collateral reading, questions and suggestions to stimulate thought, and occasional suggestions as to experiments which teachers might undertake with their classes of pupils.

After a year of this work he began to urge other members of the faculty to give lectures on professional topics before teachers' meetings, county associations, and other assemblies of teachers in the eastern part of the state. This extension and lecture work by the president and members of the faculty was undertaken, in Mr. Harvey's own words, "in the belief that the normal school as a professional school for the training of teachers should be a leader in pedagogical thought, and that its influence might properly be extended so as to reach teachers who for good reasons might be unable to take a course of training in a professional school."

Beginning in 1894 extension classes were organized on a more formal basis, and classes were conducted by members of the faculty on Saturdays at the Normal School. The courses were open only to teachers in service, regular normal school credit was given upon completion of a course, and nominal fees were charged for the service.

About this time also the activities of the school were enlarged by the inauguration of correspondence instruction. "Such was the loyal and unselfish support given Mr. Harvey that the members of his faculty conducted correspondence courses for several years without remuneration. This was the more commendable since stenographers were not available, thus requiring all communications sent out to teachers to be written in longhand."

State Superintendent of Schools

In the fall of 1898 Mr. Harvey was elected state superintendent of schools, to take office in January, 1899. He spent the intervening weeks in a careful study of school law. At the request of the governor he submitted a special report on needed school legislation, in which he expressed the opinion that the weakest features of the Wisconsin school system at that time were: (1) the existing practice of licensing teachers; (2) the comparative failure of the system to make adequate provision for the professional training of teachers for the district schools, and (3) the lack of adequate efficient, professional supervision. Governor Scofield incorporated

the recommendations, with his endorsement, in a message to the legislature.

On drafting bills to be submitted to the legislature, designed to correct or improve the conditions described, Mr. Harvey made a special study of conditions in the ungraded and rural schools, and sought assistance in preparing the needed remedy. It was pointed out that the normal schools, by action of the board of regents, admitted only students who were graduates of four-year high schools; consequently graduates of the normal schools were not available for or interested in service in the rural schools.

While progress was being made in other phases of public education in Wisconsin, no provision had ever been made for the preparation of rural teachers than the short-term institute. While city and village schools included many teachers who had been trained in normal schools, and many high-school teachers were graduates of the colleges and universities, it appeared that, with very few exceptions the country schools had no trained teachers whatsoever. Not only so, but teachers who showed ability in the country schools were drained off into the villages and cities, and professional progress in the country was practically impossible.

County Training Schools for Teachers

Under Mr. Harvey's leadership the legislature enacted a law providing for a system of county training schools for rural teachers, "the first of its kind in the United States." The law provided for a county training school board to consist of the county superintendent of schools, and two other members to be appointed by the county board of supervisors. Special state aid was provided. The board in any county in which a state normal school was not located was authorized to appropriate money for the organization, equipment, and maintenance of a county training school for teachers of the common schools. During the first year, 1899–1900, two county training schools were established. In his biennial report, submitted to the governor on December 1, 1900, State Superintendent Harvey declared:

"The success of the county training school is most marked. The graduates have given a solid year's work to the distinctive preparation for teaching in district schools and are giving back to the county in which they are teaching and to the state ample returns for the money expended on their training in better teaching service."

The legislature of 1901 provided for the establishment of six additional county training schools, and soon 32 such schools were operating. After a few years' experience it was generally conceded that, besides furnishing trained teachers, the county training schools acted as a great stimulus to local effort in the development and improvement of country schools.

Dr. Harvey's biographer makes it clear that the county training schools for teachers were established only after fruitless efforts were made to induce the state normal schools to undertake this task. It was only after the county schools demonstrated the need and pointed the way to a remedy that the state schools were willing to act. "Within a few years after the county training schools were established, the board of regents of the state normal schools appreciated the wisdom of organizing departments for the training of teachers for country schools in all the normal schools, but it must be considered unfortunate that the presidents of the normal schools, and presumably the board of regents, had failed for so many years in recognizing their responsibility in providing trained teachers for rural schools. Had they been willing to organize departments for the training of such teachers, before the county training schools were established, it is safe to say, this special system of teacher training institutions with the necessarily high per capita cost of such training would not have been called into being."

Reorganization of Teachers' Institutes

Another notable contribution made by Mr. Harvey during his term as state superintendent was his reorganization of teachers' institutes. Wisconsin school law provided that the state superintendent, in co-operation with the board of regents of the state normal schools, was authorized and required to conduct institutes for the instruction of teachers in the various counties of the state. This duty included supervision of the institutes and thus made this work an important factor in the state department of education. During his seven years of experience with institutes, while a member of the faculty at Oshkosh, Harvey had acquired a thorough understanding of the needs of teachers in the country schools, most of whom knew no other source of help, and he had definite ideas as to what might be accomplished through teachers' institutes.

As state superintendent, therefore, Harvey determined to make the institutes as effective as the available means would permit. To this end he adopted two highly significant measures: (1) He prepared a syllabus containing outlines of the various branches to be taught in the country schools, and general directions and suggestions for the guidance of county superintendents and for the conductors of institutes. (2) He organized a School for Institute Conductors, one week in length, which was held for the first time in April, 1899, and continued annually for several years. The attendance the first year was 120, and the second year 180.

The enrollment in the School for Institute Conductors consisted of members of the faculties of the state normal schools, city and county superintendents, high school principals, and other educators who expected to be available for service in teachers' institutes. "From the comments made upon the work of this school, and from the results observed in subsequent practice, it is safe to say that no one thing did so much to clarify, give definiteness to, and strengthen the work of teachers' institutes in Wisconsin, as did this school of instruction." In this school, Harvey continually emphasized the chief objective of the teachers' institute, which is to help teachers do a better job of teaching.

Co-ordination of State Normal Schools

Another epoch-making contribution by Dr. Harvey during his term as state superintendent of public instruction was the holding of a conference for the purpose of promoting unity and closer co-operation in the work of the state normal schools. In 1900, at the suggestion of the state superintendent, a survey of the normal schools was made under the direction of the board of regents. Following this survey, the biennial report of the president of the board stated that material differences in curriculums, methods of teaching, and educational philosophy had grown up which "did not seem compatible with the theory of a thoroughly organized system of normal schools under a single management. To correct this, as well as to attain other important aims, the board contemplates holding a week's institute to be attended by all the teachers in the seven normal schools, the final outcome of which shall be a better organization and unification of the professional work in all the schools and a complete syllabus of all the branches in the adopted courses of study by the best talent at the command of the board."

The board created a special committee, of which Dr. Harvey was chairman, to plan the program, organize and conduct the institute. Dr. Harvey, with the aid of members of the committee, the presidents of the normal schools, and others, prepared a very complete program covering every phase of normal school work.

On Monday morning, December 17, 1900, at the Oshkosh Normal School, the entire faculties of the seven normal schools met in conference under the leadership of Dr. Harvey. "Never before in the history of Wisconsin, nor in that of any other state,

had an entire body of people engaged in the same kind of work, comparable to this, been brought together" for such an intensive discussion of common problems. Harvey had been a member of the faculty at the Oshkosh Normal School for seven years, and president of the Milwaukee Normal School for seven years. As state superintendent and ex-officio member of the state board of regents he had had additional opportunity to familiarize himself with conditions and problems not only in the normal schools but in the public schools which the former were expected to serve through the preparation of teachers. He was therefore exceptionally well qualified to lead in the conduct of the institute and in the reorganization and co-ordination of the work of the normal schools which was to follow.

The institute opened each day with a general session in the morning, while the afternoons were devoted to section meetings. At the close of every subject during the institute opportunity was given for questions and answers and general discussion, and at the final general session Dr. Harvey answered questions submitted by members of the institute, and summarized the discussions of the week.

"It was a great and inspiring meeting. The papers and addresses showed careful preparation and a desire to contribute something of value to the teachers assembled. But it was Dr. Harvey's clear and forceful presentations of the problems of the normal schools that proved to be the outstanding feature of the institute. He discussed, among other things, the theory and practice of his four fundamentals of teaching, and expressed the hope that they might help in the improvement of courses of study and methods of instruction in the normal schools."

At the close of the meeting resolutions were adopted expressing the appreciation of the participants in the institute, and recommending that arrangements be made by the board of regents for meetings of normal school teachers from time to time with the view to unifying the work in the schools. Meetings of department teachers were held regularly for a number of years following the institute of 1900, and much progress was made in the direction of correlating and unifying the work of the teacher training institutions.

Reorganization of the Public School System

Before leaving this period of Dr. Harvey's career mention must be made of one more significant contribution. Late in 1900, after he had been in the office of state superintendent of public instruction for nearly two years, he formulated a comprehensive plan for the reorganization of the public school system of Wisconsin. Time and space available do not permit a discussion of this plan, but a summary of the points upon which specific recommendations were made will serve to indicate the thoroughness of his grasp of conditions and the phenomenal breadth of his interests:

1. More efficient supervision of rural schools.
2. Better trained teachers.
3. The addition of a new type of school to be known as the county school of agriculture and domestic economy.
4. Consolidation of rural schools.
5. Reorganization of the state normal schools.
6. Reorganization of the teachers' institutes.
7. Introduction of manual training in the grades below the high school.
8. Reorganization and adequate supervision of graded schools.
9. Professional qualifications for city superintendents of schools.
10. Provision of departments in the state normal schools for the preparation of teachers to teach the elementary principles of agriculture and domestic economy.
11. Conferences of high school teachers under the leadership of the state department of education for the improvement of organization, curriculums, methods of teaching, and standards.
12. Reorganization of the laws for the certification of teachers.
13. Stimulation of public interest in education.
14. A constitutional amendment making it possible for the legislature to provide for the appointment of county superintendents of schools (to replace popular election), and making changes in the office of state superintendent of education.

"Never before had a state superintendent outlined so comprehensive and far-reaching an educational program." The record shows that with the remarkable co-operation of the state legislature, and the widespread support of the educational leaders of Wisconsin, notable progress was made in practically all the particulars enumerated. With the expiration of Dr. Harvey's term of office as state superintendent, in December, 1902, it was necessary to leave it to others to carry on the work. Early in 1903 another notable period in Dr. Harvey's career began.

The next twenty years of Dr. Harvey's career were profoundly influenced by the educational dreams and altruistic ambitions of a close personal friend and associate, State Senator James H. Stout. The relationship was so close and so vital that an adequate understanding of the unfolding of events requires the introduction at this point of a sketch of Mr. Stout's career.

(To be continued)

A Purposeful Vocational School Certificate

ROBERT JACOBY
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Certificates and diplomas of the past seem so useless with lack of function and purpose. Conventional types indicate the name of the school district, name of the student, and the trade course which the student pursued. There is no indication of the type work completed or achievement attained. In addition, employers seldom bother to ask a student seeking employment to produce his high school diploma or certificate of achievement.

In the placement and follow-up program in the Hershey Vocational School the point is emphasized that employers should develop the habit of asking students seeking employment to produce their vocational school certificate as credentials for employment. When more employers follow this practice, students will realize more fully the value of making a good school record.

As a result of this point of emphasis the vocational director, with the co-operation of the school staff, developed the certificate which is shown in Figures 1 and 2. The primary purpose was to develop a certificate small in size to permit graduates to carry it easily and present it for inspection by employers. At the same time we were interested in developing a certificate brief in

Hershey Vocational School

Hershey Pennsylvania

This certifies that

John Jones

has completed the courses of study to the extent indicated on the information sheet of this certificate and is deserving of advanced rating as an apprentice in

Printing

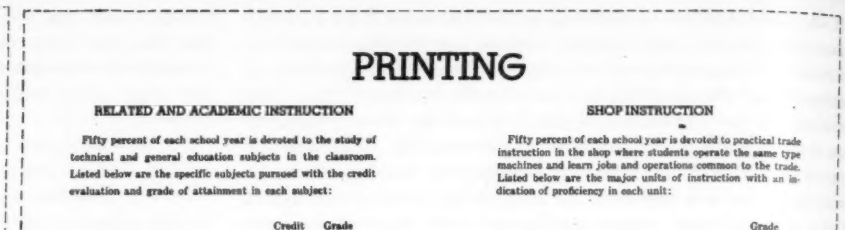
In recognition whereof he is granted this

Certificate

by

The Board of Education of the Derry Township Public Schools

Robert Jacoby Raymond H. Koch



PRINTING

RELATED AND ACADEMIC INSTRUCTION

Fifty percent of each school year is devoted to the study of technical and general education subjects in the classroom. Listed below are the specific subjects pursued with the credit evaluation and grade of attainment in each subject:

	Credit	Grade
Tenth Grade English	(1)	(B)
Eleventh Grade English	(1)	(B)
Twelfth Grade English	(1)	(A)
United States History	(1)	(C)
Industrial Economics	(½)	(B)
Problems of Democracy	(½)	(B)
Arithmetic and Shop Mathematics	(1)	(A)
Practical Geometry	(½)	(B)
Practical Trigonometry	(½)	(B)
Related Chemistry	(1)	(C)
Related Physics	(1)	(B)
Related Drafting	(1)	(B)
Physical Education	(1)	(A)

A—93 to 100 or Excellent
B—85 to 92 or Good
C—77 to 84 or Fair
D—70 to 76 or Passing
E—Below 70 or Failure

SHOP INSTRUCTION

Fifty percent of each school year is devoted to practical trade instruction in the shop where students operate the same type machines and learn jobs and operations common to the trade. Listed below are the major units of instruction with an indication of proficiency in each unit:

	Grade
Layout - Design	(C)
Hand Composition	(A)
Linotype	(X)
Imposition and Lock up	(B)
Platen Press	(B)
Cylinder Press	(C)
Kluge Press	(C)
Miehle Vertical Press	(A)
Proof Reading	(B)
Newspaper Makeup	(C)
Trade Theory	(A)
Stock Room	(A)
Leadership Possibilities	(C)

Years attended: 1 - 2 - 3

Date of Enrolling September 1944 Date of Leaving June 1947

Fig. 1. (Left) Cover page of vocational certificate. Fig. 2. (Right) Inner pages of vocational certificate showing units of instruction in the shop and related and academic subjects

form with some indication of course content as well as some standard of attainment in the shop and classroom instruction.

The certificate is made up in the form of a 5½ by 8½ in. four-page folder. Page one, shown in Figure 1, indicates the usual information including name and location of school, name of the graduate, and trade pursued. At the bottom is sufficient space for signatures by the superintendent of schools and director of vocational education.

Figure 2 lists the specific related and academic subjects pursued in the three-year vocational curriculum with a space for inserting the credit evaluation and grade of attainment in each subject. The opposite side of the page lists the major divisions of shop instruction with a grade indicating proficiency in each unit.

This certificate has many advantages over the conventional type. It is small and compact in size and the information it gives is brief and meaningful. The employer can observe at a glance the composite record of the student. It also indicates the units of the trade in which the student is most proficient. This is of considerable value in assisting the employer in the placement of the student on his first job.

Methods of Teaching Occupational Subjects

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(*Continued from page 222 of the June, 1948 issue*)

Every shop instructor should develop the ability to put over the preparation step by the use of any of the five methods listed in the foregoing. To illustrate the application of each method, we shall use the lesson plain drilling on flat work (series of holes same size).

The *first method* we shall illustrate is,

Look over class and make a few pertinent remarks on the importance of the lesson.

Some shop instructors accomplish the purpose of the preparation step by looking around the class until they feel that they have gained the attention of all members of the class. Then, they say a few words about the lesson, possibly supplementing their remarks with a few questions. Thus they build the step up to a climax, and during the process they arouse the interest of the class.

Now, this method of putting over the preparation step appears simple, but it requires a considerable amount of skill, and the instructor must be a good disciplinarian. It can be used by the experienced and successful instructor, but it should be used sparingly by the inexperienced instructor.

The *second method* available to arouse interest in the lesson is,

use an illustration.

The instructor, first, supervises the assembly of the class. Then, he can have two pieces of work; the first, a piece of sheet metal through which a hole has been punched in a punch press; the second, a flat steel plate in which he intends to drill

a series of holes. He points out why the punch press is used to produce the hole in the sheet metal. Then, he picks up the flat steel plate (at this point the instructor is building the preparation step up to its climax), and he points out that the punch press can not be used to produce a series of holes because the plate is too thick. Then, the instructor declares that the drill press is used in industry to produce a series of holes in a flat steel plate, and, today, we are going to drill a series of holes (same size) in this plate by using the upright drill press. The presentation step follows since a climax has been reached in the preparation step.

The foregoing method can be used effectively by both experienced and inexperienced instructors, but we should not assume that equal success will be enjoyed in all cases. Exclusive of the time required to assemble the class around the drill press, using the foregoing illustrations should require no more than four or five minutes to accomplish its purpose, that is, prepare the students by arousing their interest. Of course, we have enough available material in these illustrations to consume at least thirty minutes, but this amount of time would defeat the purpose of the preparation step.

It is assumed that the shop instructor assembled the sheet metal and the flat steel plate before he assembled the class. In addition, they should be readily available during the preparation step. Nothing will cause students to lose interest quicker than an instructor who fumbles around to put his hands on his illustrative material during the preparation step. He should pick up these materials with the same assurance as the dentist in picking up his tools when he works on your teeth.

The successful shop instructor will also use *suggestive* and *informational* questions in putting over this method. They will be either *direct* or *overhead*, but if he uses a *direct question, under no circumstances should he call on a second student when the first one fails to give the correct answer.* In this case, *the instructor, himself, should give the answer after the first student fails.* Remember, the purpose of the step is to arouse interest, and any needless delay will destroy interest. If the shop instructor has any doubts about this, let him ask John the question which William failed to answer during the preparation step, and let him observe the effect upon the interest of the class.

Perhaps, *it would be wise for the beginning shop instructor to use only a few questions in the preparation step until he gets the feel of things,* and under no circumstances should he use the questions in this step to "stump the students." Ask a question only when you are sure you will get the answer. If you cannot be sure you will get the right answer, by all means do not ask the question. If it is felt that the students should know this information, *tell it to them. Never "fish for answers" in the preparation step.* The instructor who does has lost sight of the purpose of the step.

The *third method* that can be used to put across the preparation step is,

tell a story or incident related to the lesson.

This method is too often used. It is the after-dinner-speaker method, and it should be left to the after-dinner speaker. There are, however, cases when a story, relating to the lesson, can be used successfully but, first, the shop instructor should be fairly good at telling stories, and, perhaps he should practice telling the story before the lesson.

The *fourth method* that can be used to put across the preparation step is,

use question and answer technique.

The question and answer technique is a satisfactory method of arousing interest and gaining attention during the preparation step. This is especially true if direct questions are used. It tends to keep the students on their toes.

In using this method, questions should not be aimless. They should, on the other hand, tend to build up the preparation step to a climax, at which point the instructor *immediately* passes on to the presentation step.

It is not necessary to ask a dozen or more questions to arouse interest in the lesson. In fact, that many questions could destroy whatever interest has been aroused. Then, too, the questions should involve something about which the *students are already familiar.*

The shop instructor might follow a procedure as follows when using this method:

1. Supervise assembly of students around drill press.

2. Make a statement on something concrete and about which you wish to build the preparation step. It could concern drilling holes in a board.

3. Ask six or eight questions, either direct or overhead. They should be suggestive and informational questions. Questions need not be "rapid fire." In the case of some questions, the instructor may wish to make some comment after obtaining the answer.

4. Make comments brief. Ask questions to develop the step up to a climax. The following are samples of questions:

Did you ever drill a hole in a board, John?

What is the name of the tool used to drill a hole in a board, George?

Why do you apply pressure, or push against the brace, William?

Do you have to apply much pressure on the brace, Edward?

What determines the amount of pressure you apply to the brace, Robert?

Why is it impossible to drill a hole through steel with a brace and bit, Hugh?

How do we produce holes in steel, Gordon?

The foregoing questions develop the preparation step up *to a climax.* These questions are followed by a statement made by the instructor which leads into the presentation step. Thus,

today, I am going to show you how holes are drilled in a flat steel plate exactly as it is done in a machine shop.

The instructor, here, goes into the presentation step.

The *fifth method* of putting over the preparation step is,

putting on a demonstration.

This is a very effective method of putting over the preparation step, but the demonstration should be carefully chosen and have a direct bearing upon the lesson, which is plain drilling flat work (series of holes same size).

Perhaps one of the effective demonstrations for this lesson would involve drilling a hole in a block of wood approximately the same size as the flat steel plate.

The instructor could follow this procedure:

1. Supervise assembly of class at bench.	
2. Clamp wood in vise.	2. Why do we clamp the wood, John?
3. Insert the bit in brace and tighten.	
4. Place point of bit against wood at center of hole to be drilled.	
5. Drill hole.	5. Why do we apply pressure against brace? 5. Why release pressure when bit breaks through?
6. Remove bit from hole.	

The following sentence is the climax in the preparation step:

7. Today, we are going to drill holes in a flat steel plate (series of holes same size), and if you will watch carefully, you will note that we apply the same principles in drilling holes in a flat steel plate that we used to drill a hole in the wood.

Next, the instructor quickly assembles the class around the drill press and proceeds with the presentation step. It would be far better to put over the demonstration in the preparation step at the drill press to avoid the second assembly of the class. It is entirely possible that much of the interest, developed during the demonstration, could be lost while the class is moving from the bench to the drill press.

As noted in the foregoing outline of the demonstration, several questions should be asked during the demonstration, and since a demonstration in the preparation step should relate to the lesson, which is plain drilling flat work (series of holes same size), the questions, too, should relate to the lesson. Again, since the preparation should cover material with which the class is already familiar, the instructor should select the demonstration with the greatest care. As a result, it is not always easy to select a demonstration for the preparation that is appropriate for the lesson. For example, no shop instructor would consider a demonstration which involves the sawing of a board as the preparation step for this lesson in drilling. Such a demonstration might be used successfully if the lesson to be taught is sawing off stock in the power saw, but it would have no application whatsoever to plain drilling.

Too often, shop instructors use a demonstration which requires too much time. In any shop lesson, the class should not be subjected to a preparation step whose length is over ten minutes. No doubt, a demonstration in the preparation step can consume from five to ten minutes without destroying interest, but this limits the use of demonstrations in this step. Perhaps it would be well to remember that preparation steps "flop" more frequently because they are too long than because they are too short.

In conclusion, we should always bear in mind the purpose of the preparation step when we plan the step. We have five different methods available to accomplish this purpose, and we should select the method that will arouse the maximum interest in the minimum time.

(To be continued)

Evaluating Drafting or Shop Products

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It is necessary that teachers give more attention to evaluating the results of their instruction. Many neglect this phase of their work for several reasons. It is time consuming, it is boresome, it often leads to controversies regarding grades, the teacher may not know how to grade scientifically, or he may be overloaded with both regular teaching work and extracurricular activities. The teacher, therefore, is forced to make a hasty evaluation and to take a chance on the accuracy of the results. All of these faults can be corrected, and no doubt will be, as teachers become better prepared and more professional, when schools pay better salaries, and when they can have staffs of sufficient size to do the teaching job as it should be done.

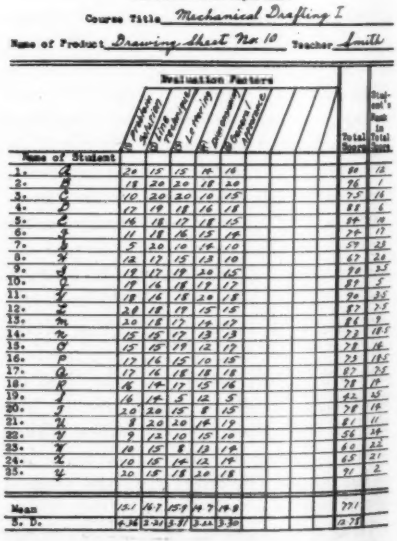
Any system of evaluation can be no more accurate than the measuring instrument used and the ability of the user to use it. Measuring the students' ability in drafting or shopwork cannot be as accurate as the results the student can get measuring his own drawing or piece of material for a project. The student uses a standard physical measuring instrument with which he compares all that he measures. The teacher in measuring the students' achievements has no such accurate standard. His measurements must be relative to the group; that is, he must evaluate the work of each student in the group and give him a ranking in the group. The process is really one in which the teacher attempts to find the best student and the poorest and then places all the others in order of merit in between. The process of ranking the students can be made more accurate by the use of the Z-score or T-score technique used in statistics.

Suppose, for example, a teacher of drafting desires to grade his students on the following five factors: (1) accuracy of problem solution, (2) line technique, (3) lettering, (4) dimensioning, and (5) general appearance.

The teacher may make a breakdown of each of the above factors and assign points for each element of the breakdown. He then goes through each drawing sheet for each student and evaluates the sheet assigning points according to his judgment of what they are worth. The total of the points gives the total grade for the sheet. Usually the teacher will not spend the time to evaluate properly a sheet on the point basis. He may decide that he will weight each of the five factors equally by allowing each one 20 points apiece. He then gives each sheet a cursory examination and assigns to each factor the number of points he feels proper at that particular time.

Regardless of how the teacher assigns the points, he will not achieve a fair ranking of the students' drawing sheets by merely totaling the points. The points allowed on each factor will automatically weight themselves according to how far they deviate from the mean (average) of the distribution. They are thus weighted automatically and not deliberately as they should be.

The only way to compare scores on drawing sheets is to use comparable scores such



PRODUCT-EVALUATION RECORD

Industrial-Arts Department

Course Title Mechanical Drafting I

Name of Product Drawing Sheet No. 10 Teacher Smith

Name of Student	Evaluation Factors: Problem Solution	Line Technique	Lettering	Dimensioning	General Appearance	Total Score	Student's Rank in Total Score
1. A	20	15	15	14	18	82	18
2. B	18	20	20	18	20	96	1
3. C	10	20	20	10	15	75	14
4. D	12	18	18	16	18	82	6
5. E	14	18	17	18	15	82	8
6. F	11	18	16	15	14	74	17
7. G	5	20	10	14	10	59	22
8. H	12	17	15	13	10	67	20
9. I	15	17	19	20	15	86	3
10. J	19	16	18	19	17	89	5
11. K	18	16	18	20	18	90	2
12. L	20	18	19	15	15	87	7
13. M	20	18	17	16	13	84	9
14. N	15	15	12	13	13	68	19
15. O	15	15	19	12	13	74	16
16. P	12	16	15	10	15	73	15
17. Q	12	16	18	18	18	82	6
18. R	16	14	17	15	16	78	10
19. S	16	14	5	12	5	52	13
20. T	20	20	15	8	15	78	10
21. U	8	20	20	16	19	83	11
22. V	9	12	10	15	10	56	24
23. W	10	15	8	13	19	65	21
24. X	10	15	14	12	15	66	21
25. Y	20	18	18	20	18	94	2
Mean	15.1	16.7	15.9	14.7	14.8	77.1	
S. D.	4.36	2.24	3.87	3.44	3.30	10.78	

Fig. 1. Showing the evaluation factors used, the score points assigned by the teacher on each factor, and the total score points considered. The mean and standard deviation of the class for each of the factors is also shown

as the Z-score. This technique changes all scores assigned to the factors on the basis of their deviation from the average of the entire group. The student may be above average in problem solution and below average in line technique. If at any time it is desired to weight any of the factors more than others it can be done by assigning the desired weight to the Z-score for that factor. The total of the Z-scores for each factor in the grading system will give a more accurate ranking than the mere totaling of points.

Take a glance at Figure 1. It shows the scores assigned to each of the members of a class of 25 students on Drawing Sheet No. 10. The mean and standard deviation of the group is also figured for each factor. If the teacher has forgotten how to do these calculations he should consult any standard book on statistics such as Lindquist's.[1] Equipped with a slide rule and a small hand adding machine or a calculator the work is not difficult. The teacher may even train an assistant or student to do the calculating.

Regardless of who does the work, the teacher should learn to use these statistical procedures as a part of his professional tool kit. Figure 1 shows the points assigned to each student on each factor, the total points for the sheet for each student, and the rank of each student in the class according to his total score on the sheet.

Now let us see how the rank of each student is affected if his scores are changed to Z-scores. Figure 2 shows the same points as in Figure 1 but the Z scores are also given for each factor. On the right-hand side is given the total score in points, the total in Z-score points, and the rank of each student by total points and by Z-score points. To show how the ranking of students changes when Z-scores are considered Figure 3 is included. In this figure the student who was sixth by total points was second when the group average was considered and Z-scores figured. Also you will note other interchanges.

Referring back to Figure 2, observe that student *R* and student *T* have the same total-point score and would be equally good in rank. When the average of the group and their rank in the group is considered by Z-scores, however, student *T* ranks twelfth in the class while student *R* is only sixteenth. Also note that the Z-score indicates that student *R* is below average in the class and student *T* is a little above average.

Now in case the teacher decides to count problem solution a little heavier and assigns it 40 points he will then divide the remaining 60 points among the other four factors according to what he thinks each is worth in a total of 100 points. No matter how he does it he is never sure that the end result will give him the ranking of the students he is seeking. The mere adding of the points or doubling them will not rank the students according to their worth among the other members of the class. In case the teacher does decide to count one factor as worth more than another in the evaluation of the students' work let us assume that ability to solve the problem is worth twice as much as the other factors.

[1]Lindquist, E. F., *A First Course in Statistics*, New York, Houghton Mifflin Co., 1942.

PRODUCT-EVALUATION RECORD

Industrial-Arts Department

Course Title Mechanical Drafting I

Name of Product Drawing Sheet No 10 Teacher Smith

Name of Student	Evaluation Factors										Total Score	Total Z-Score	Student's Rank in Total Score	Student's Rank in Total Z-Score
1. R	20	40	20	20	20	20	20	20	20	20	80	-.09	16	13
2. B	18	40	20	20	20	20	20	20	20	20	78	.539	11	7
3. C	20	40	20	20	20	20	20	20	20	20	80	-.28	16	14
4. T	17	40	20	20	20	20	20	20	20	20	77	.241	6	2
5. G	18	40	20	20	20	20	20	20	20	20	78	.177	10	10
6. S	17	40	20	20	20	20	20	20	20	20	77	-.81	17	17
7. A	5	40	20	20	20	20	20	20	20	20	65	-2.36	23	23
8. X	12	40	20	20	20	20	20	20	20	20	72	-1.08	20	20
9. J	19	40	20	20	20	20	20	20	20	20	79	.346	3.5	3
10. E	19	40	20	20	20	20	20	20	20	20	79	.177	5	6
11. Y	18	40	20	20	20	20	20	20	20	20	78	.322	8.5	9
12. F	20	40	20	20	20	20	20	20	20	20	80	.438	2.5	1
13. M	20	40	20	20	20	20	20	20	20	20	80	.177	5	7
14. N	19	40	20	20	20	20	20	20	20	20	79	.053	8.5	8
15. O	15	40	20	20	20	20	20	20	20	20	75	-.98	14	15
16. P	17	40	20	20	20	20	20	20	20	20	77	-1.20	18.5	19
17. Q	17	40	20	20	20	20	20	20	20	20	77	.237	7.5	5
18. R	16	40	20	20	20	20	20	20	20	20	76	-.59	12	12
19. L	16	40	20	20	20	20	20	20	20	20	76	-1.78	15	15
20. U	20	40	20	20	20	20	20	20	20	20	80	.07	14	11
21. W	8	40	20	20	20	20	20	20	20	20	68	-1.63	21	21
22. Y	19	40	20	20	20	20	20	20	20	20	79	.451	3.5	4
23. K	18	40	20	20	20	20	20	20	20	20	78	-1.15	22	22
24. X	20	40	20	20	20	20	20	20	20	20	80	-1.93	24	24
25. V	20	40	20	20	20	20	20	20	20	20	80	-2.17	25	25
Mean	17.5	40	20	20	20	20	20	20	20	20	77.1			
S.D.	3.6	0	0	0	0	0	0	0	0	0	10.78			

Fig. 2. Showing the Z-scores for each factor, and the rank of each student in the class by total score points and by total Z-score

Relationship of Rank of Students in Z-Scores and in Total Scores

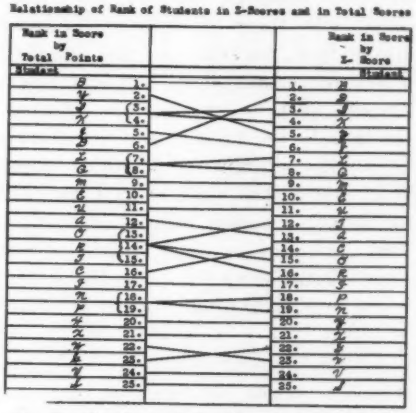


Fig. 3. Showing relationship of the rank of student by total score points on the drawing sheet to the rank after the total Z-score for the sheet is calculated. Half ranks are not designated but the correlating lines are drawn from between the numbers in the left-hand column, e.g., there is no rank of 4 in the left-hand column. Both 3 and 44 have a rank of 3½ but the rank by Z-score in the right-hand column tells which really ranks third and which ranks fourth

Figure 4 compares student *Y* and student *D* before and after weighting of the single factors. Student *D* was the better over-all student before weighting of factors but student *Y* is the better after weighting. It can be seen that weightings assigned after comparable scores (Z-scores) are secured may change the ranking of any of the students.

Z-Scores before Weighting — Z-Scores after Weighting

Problem Weighting is given twice as much weight as others.

Name of Student	Problem Solution	Line Technique	Symmetry	Dimensions	Lettering	Total	Problem Solution	Line Technique	Symmetry	Dimensions	Lettering	Total
Y	.44	.98	.52	1.55	.91	3.17	2.28	.45	.52	1.55	.91	4.31
D	.66	.98	.52	.62	.91	3.41	.92	.98	.52	.62	.91	3.97

Fig. 4. Showing the effect on a student's total Z-score after giving a weight to the Z-score of any factor. Student "Y" now ranks higher than Student "D" when problem solution is rated as worth twice as much as the other factors. Student "Y" ranked second in total score on the drawing sheet and fifth in rank when Z-scores were calculated. Student "D" ranked sixth in total score by points on the drawing sheet and second when Z-scores were calculated

This article would imply that shop and drawing teachers review their simple statistical tools and practice their use and interpretation. It will help to ease the teacher's mind when the time for fair evaluation of student and teacher's work comes along at the grading intervals.

The methods of finding the mean and standard deviation will not be discussed since the teacher can get them from any general statistics book as previously mentioned. After these two statistics are found for the class the Z-score merely relates the position of the student to the average or mean of the entire group. The Z-score is obtained by subtracting the mean of the group from the individual score algebraically and dividing by the standard deviation. The formula is $Z\text{-score} = \frac{X - M}{S.D.}$ where X is the individual student's score, M is the arithmetical mean or average of the group in the considered factor and $S.D.$ is the standard deviation or measure of variability or spread of the group about the mean of the distribution of scores.

The most significant aspect of the achievement is the fact that one quarter of all the steel produced in this century to date was made in the past six years and two months of the period.

That amount of steel was produced in the period from September, 1941, to October 31, 1947, and was nearly equal to all the steel made from 1901 to 1918, inclusive. — *Steel Facts.*

Industrial Arts and Vocational Education

John J. Metz, Editor

TWO WEEKS THAT DESERVE ATTENTION

The week of October third to the ninth, this year, has the distinction of having been designated as the National Employ the Physically Handicapped Week, as well as the National Fire Prevention Week.

Both of these movements hold much of interest to the teachers of industrial arts and vocational education. Rehabilitating the physically handicapped is nothing new in the field of vocational education. As a matter of fact, one of the divisions of the American Vocational Association, headed by a vice-president of that organization, is devoted to the rehabilitation which is carried on under the supervision of the directors of vocational directors in the various states. There are approximately one-half million disabled workers, among them many disabled veterans, who are looking for jobs which they might do, in spite of their disabilities.

Surveys, made by the Department of Labor and of the Veterans Administration, show that the physically handicapped are just as efficient, just as stable, just as reliable, just as careful, and just as versatile, as are able-bodied workmen.

Helping this cause along does more than merely give jobs to men. In many cases it means giving new life and hope to a person, who, because of disabilities suffered, has lost hope of being able to earn a living for himself and family.

But what can the instructor of industrial arts and vocational education do in a promotional way during the "National Employ the Physically Handicapped Week?"

First of all, announce to your students that such a week is to be held. Get them to talk about the need to help the handicapped, as well as to help industry which still is short of man power in many areas. Have your students also look at the handicapped from the humanitarian side. If possible, give them a printed or a mimeographed sheet telling them and their families that employment and training services now are available to impaired workers through State Vocational Education departments, State Employment Services, and State Offices of Vocational Rehabilitation.

Publicize this information also in your school papers, and, if possible, in local newspapers. Try also to contact the employers in your community. Many of them will be astounded to learn that a two-year study made by the U. S. Department of Labor, in which the work records of eleven thousand physically, seriously impaired workers were compared with those of eighteen thousand able-bodied workers in one hundred plants, demonstrated the fact that handicapped workers are just as efficient, stable, reliable, careful, and versatile.

Taking cognizance of Fire Prevention Week during the week of October third to ninth, of course, also is important. This dreadful scourge claims about eleven thousand victims annually — men, women, and children, burned to death or killed by deadly gases. Another fifty thousand persons suffer painful and crippling burns. In addition, fire annually destroys homes, factories, stores, schools, churches, warehouses, farms, and forests, to the tremendous amount of seven hundred million dollars.

These losses are appalling and something must be done about them, but whose job is it? Shop instructors have a fairly difficult job, as it is, but fire prevention is such a serious task that these teachers, too, must take a part in it. In point of fact they can do quite a bit to help this movement along without leaving their classrooms.

There is, first of all, the task of eliminating every possible fire hazard in the school shop. Secondly, arouse a realization of the seriousness of the fire problem to life and property if a fire should start in the shop. Plan a campaign with the students to eliminate all careless acts which might cause fires. Train everyone in the shop to be on the alert to discover fire hazards. Co-operate in every way with the school authorities to make the school safe against the danger of fire.

Help students carry fire prevention practices over into their own homes. Make them enthusiastic in co-operating, in school and out, with every effort of community fire departments to curb the ravages of that arch fiend — fire.

Make use of fire prevention week to start a year-round campaign against fire.

WE MUST PROGRESS

Can we, who are not only interested but actually participating in teaching, supervising, or directing industrial arts and vocational education in our schools, feel satisfied in presenting our subjects to new students in the same old way that we have followed probably for years?

Granted that you have done a good job of teaching, that your students did good work, and that your principal was satisfied with your efforts, can you truthfully say that you have been satisfied with your own work?

If you haven't been, why not resolve to do better in the school year that has just opened. Have you, for instance, tried to improve the layout of your shop? There may not be much that you can do about the shape and size of your shop, but a little planning might give you a better arrangement for your benches, the toolroom, storage cabinet, or the project-display case. A change like this in your shop will have a good psychological effect on yourself as well as on the students.

Many shops have not had a coat of paint on the walls and woodwork for years. They produce a depressing effect on anyone who enters them. If you have such a shop, can you do something about it? And how does your machinery look? It, too, might be the better for a coat of enamel, and don't forget to study up on color dynamics. The Pittsburgh Plate Glass Company, Paint Division, Department IV — 28, Pittsburgh 22, Pa., will send you a free copy of "Color Dynamics in Industry."

When was the last *new project* introduced into your course? It will increase the student's interest to know he is working on something new. It would arouse his interest still more if he could see just how the design was arrived at, how each piece was made, and finally, how the different parts were assembled. Have you arranged such a display board for one or more projects so that the beginner can satisfy his most laudable curiosity?

It is assumed that you have a large outline of your course, prominently displayed somewhere in your shop. How old is it? Can it still be read? If it is not in the best condition why not make a new one? That will give you a chance to make needed changes on it.

How about your safety posters. Ought they not be subjected to a good revision? And then, be sure not to forget that progress chart. Students are interested to know how they measure up in comparison with other students.

Has the bulletin board been cleaned up and have you selected a few good clippings to put up on it? Try to make that bulletin board an attention getter for this year. A great many items of related material can be brought to the students' attention in this way.

Many other suggestions for improvement might be made, and the foregoing recommendations may call others to mind. At any rate, if but one of those listed be followed, this school year will be better than the last.

A Basic Engineering Course at the U. S. Merchant Marine Academy

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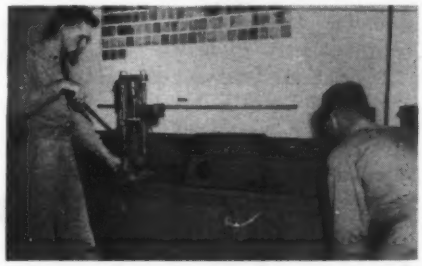
Within the past few years, and due in part to the tremendous demands of wartime shipping, great strides have been made in the education of the marine engineering officer. The complicated, expensive equipment found on the modern merchant vessel requires for efficient operation well-educated, highly skilled personnel. In addition to training in leadership and to courses in personnel administration and ship management, the marine engineering officer must master the basic concepts of general engineering practice.

Realizing that the accelerated wartime courses at the United States Merchant Marine Academy at Kings Point, N. Y., lacked instruction in some of these basic engineering concepts, the administration established a course in engineering materials and processes to rectify this shortcoming. Realizing also that too many courses in theory create an unbalanced education program, much time and effort have been put forth to establish a laboratory where cadet midshipmen can test, observe, and verify certain engineering phenomena with which they will have contact in some aspect of their future assignments as marine engineering officers.

Cadet midshipmen examining the microstructure of steel with the metallurgical microscope

The coast guard's *Rules and Regulations and Material Specifications* establishes a variety of standards which must be met by manufacturers of shipbuilding materials before they can be accepted for use aboard merchant vessels. Cadet midshipmen must become fully cognizant of these regulations for both license preparation and general information, and they must have a *full* understanding of their interpretation. To prepare the cadet midshipmen in this respect becomes an important part of the functions of the materials testing laboratory. In a series of laboratory experiments, the student tests the metallurgical properties of boiler tubes, rivets, stay bolts, and pipe. He also checks and verifies the standard flare test for boiler tubes, the bending properties of plating, the tensile strength and heat-treatment of steel and a variety of materials that go into the make-up of a ship.



Fatigue testing and plastic molding equipment

A keynote in all courses given at the academy is correlation. Department instructors meet and consult with each other; together they plan the department curriculum and together they revise and develop this curriculum to maintain its present level fulfilling the objective: "To train marine engineers second to none."

Rickwell and Brinel hardness test equipment

As an integral part of their training, individual cadet midshipmen machine test specimens in the academy's shops. In the early part of their machine-shop course the men are taught basic machine operations and tool skills. During this phase of the program the students machine to close tolerances such specimens as Izod and Charpy impact test pieces, fatigue, torsion and tension test specimens in addition to the regular required projects. In welding classes the students prepare coupons in accordance with coast-guard rules and regulation specifications and in the materials testing laboratory these are later put under tension and bending stresses to determine the quality and properties of the welded joints.

The equipment in the materials testing laboratory includes Rockwell, Scleroscope and Brinell hardness testers, torsion, tensile, compression and bending machines, rotating beam fatigue tester, and machinery for conducting impact tests of the Charpy, Izod, and Tension-Impact varieties. Four metallurgical microscopes are used for the more detailed study of metallic structure and a photomicrographic camera is available for taking pictures of the microstructure of metals for further study.

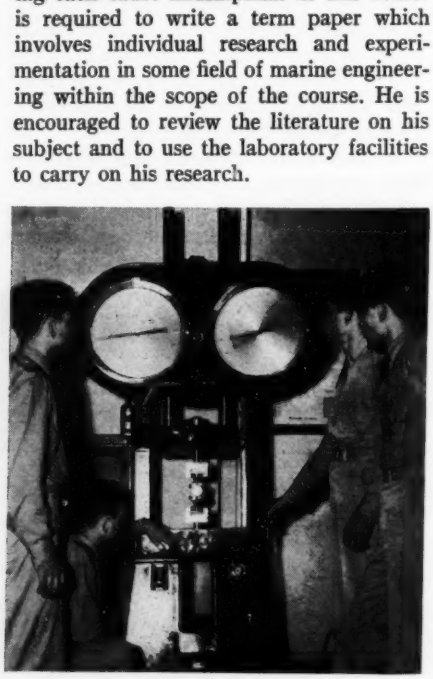
Manufacturers of marine equipment have been very generous in contributing models, cutaway sections, gauges, and varieties of equipment which are used in the classrooms

Steel bar being tested for torsional strength

A group of cadet midshipmen conducting a Charpy Impact test on steel

and laboratories. With the aid of these devices, cadet midshipmen can better understand and more clearly visualize the intricate workings of the equipment with which they will work as marine engineers. Motion pictures and slide films from the United States Office of Education and private manufacturing concerns are shown at pertinent intervals and field trips to industrial plants are used extensively to supplement the classroom and laboratory work.

To integrate further his technical training each cadet midshipman in this course is required to write a term paper which involves individual research and experimentation in some field of marine engineering within the scope of the course. He is encouraged to review the literature on his subject and to use the laboratory facilities to carry on his research.



The tensile strength of boiler plate being checked and verified

The effectiveness of such a course has already been proved by careful observation and examination of the students. Although the student is given a maximum of freedom to conduct his own experiments and research in the laboratory, an instructor is always available for consultation. The student receives a *practical* grade determined by frequent spot checking done as tactfully as possible by the instructor without interference during the laboratory hours. The student is also marked proportionately for the report he ultimately submits as a course paper and for the tests he is given as the course progresses.

The plan of the course generally is based on the belief that although the teaching process is largely carried on in the classroom under the direction of an instructor, the actual learning process is carried on in the study hall, in the library, and in the laboratory by the student himself. It has been necessary to define new objectives of the curriculum and of the individual courses to keep abreast of the new and expanding demands made of today's merchant marine officer. After determining these over-all curriculum objectives, the individual courses have been planned, correlated, and co-ordinated and the need for new courses carefully evaluated. Once the scope of an individual course has been decided upon, careful consideration for the most effective and interesting method of presentation has resulted in the organization of a laboratory recitation course such as the one described in the foregoing.

In his individual study, the cadet midshipman will, of necessity, discover many of the basic concepts of general engineering practice that should serve him in his work aboard the modern marine vessel. This ability to work alone with the complicated machinery in his field will have been developed and his general value as an all-round engineer will be thereby assured.

A Description and Analysis of Four Techniques of Counseling

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Each of four techniques, namely, *interview, tests, occupational analysis,* and *psychotherapy,* were examined at length and found to have certain limitations.

The *interview* can be considered successfully only if it fulfills the following requirements:

1. It must aid the personnel worker in making a more accurate and complete diagnosis.
2. It must open up new avenues of adjustment to the interviewee.
3. It must be a satisfactory experience for the interviewee.

The weight of the testimony is that the technique of *testing* is inaccurate for predicting future achievements. While valuable for diagnosis, it has decidedly limited prognostic values.

The study and analysis of occupations and occupational interests is largely an unexplored field in most high schools. Administrators have not seen fit to employ properly trained personnel for these purposes. While approximately 90 per cent of the boys and over 50 per cent of the girls have vocational preferences, less than 7 per cent of the graduates, and 5 per cent of those who do not graduate are directed to their jobs by their schools.

Occupational analysis is needed: (1) in making a choice of a vocation; (2) in training to enter the vocation; and (3) in readjustments in the occupation and away from it in case it proves unsatisfactory. As most people are fitted for hundreds of occupations about as well as any particular one, the choice of the one entered is very arbitrary. Hence, scientific techniques in occupational analysis are largely limited to the accuracy with which occupations are analyzed and described. The occupational versatility of the individual is usually far greater than the individual is aware, and scientific analysis seems to confirm this conclusion.

The success of *psychotherapy* is dependent upon the sincere desire of the counselee

to bring his problem out into the open. There are hundreds of hidden factors that influence conduct. No analysis can reveal them all, or even the most vital ones. Psychotherapy is a very costly technique of counseling and one not generally adopted, and very few people are trained or are in training for this form of guidance.

The four techniques stress the use of improved and extended vocational counseling in achieving better adjusted citizens and a more stable society.

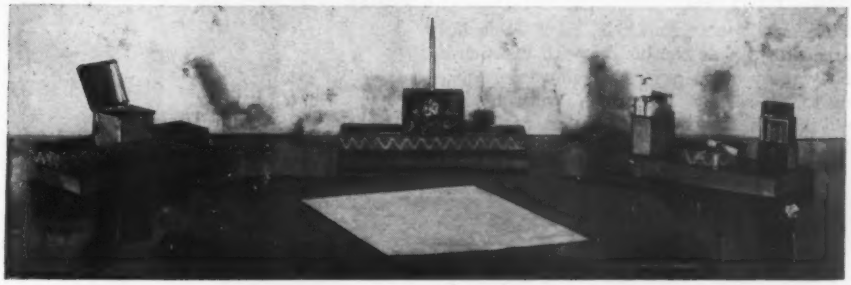
Problems and Projects

PENCIL HOLDER AND TRAYS

FRANKLIN H. GOTTSHALL

Boyertown, Pa.

This is the third in a series of articles designed for a writing desk in a boy's room. It consists of a wooden base to which is nailed a long tin tray which is designed to hold smaller curved-bottom trays and a wooden block having drilled holes which will hold pens and pencils. The ensemble may be painted in one or more bright colors. An attractive design is included which may be used to decorate the pencil holder.



Pencil holder and trays

MATERIALS REQUIRED

One base, wood 5/8 by 4 by 9½ in.
One pencil holder, wood, 2 1/16 by 3⅜ by 2½ in.
One tray, tin, 4 by 11⅜ in.
Two curved bottom trays, tin, 3½ by 4⅞ in.
Solder
Enamels

Procedure

1. To make the base, procure a piece of wood and plane and square it to the sizes given in Figure 14. Lay out the groove, and cut it out with a gouge. Sandpaper the base.

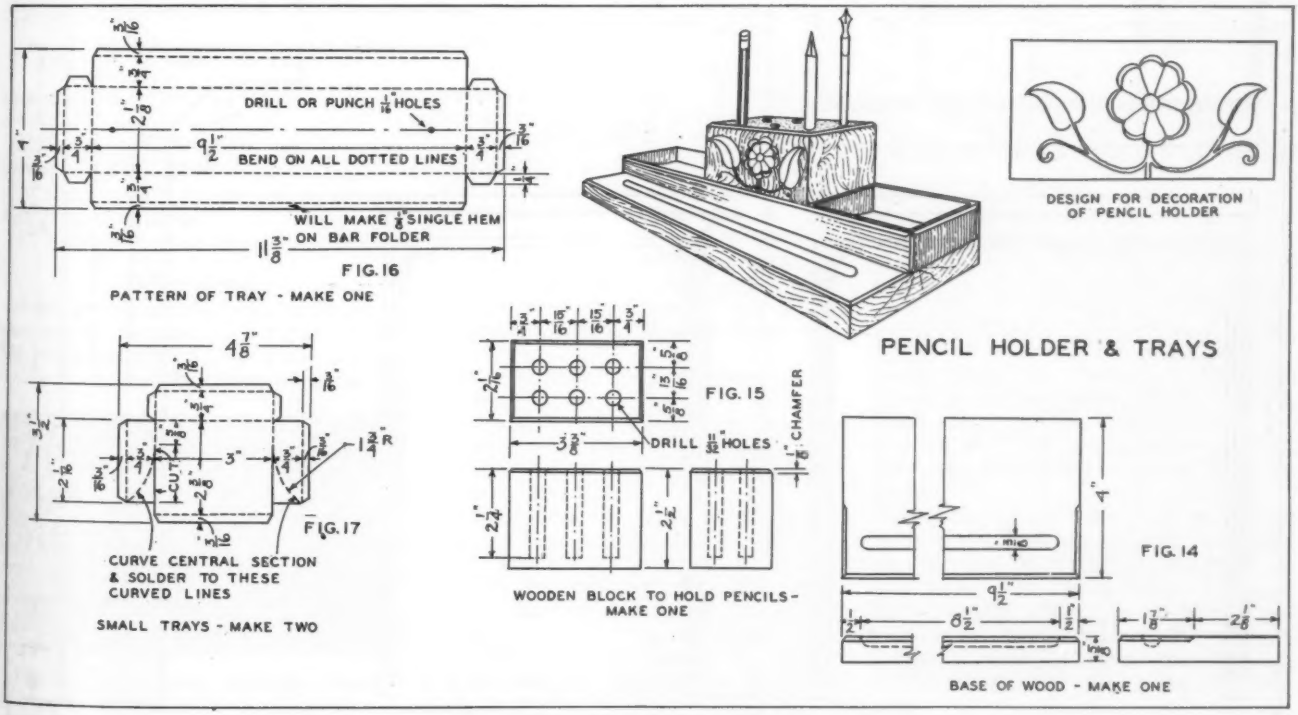
2. To make the pencil holder, procure or glue up a block of wood, and plane and square it to the dimensions given in Figure 15. Drill the holes as shown.

3. To make the large tray, make a paper pattern, and from it transfer the lines to the tin with a sharp scriber.

4. Make the ⅛-in. single hem on each side of the tray.

5. Bend up the long sides as shown in Figure 6. Then bend the short sides as shown in Figure 7. See page 207, in the May, 1948, issue.

6. Bend the flaps and solder all joints. Drill two holes and fasten the tray to the base with nails.


DRILL OR PUNCH 1/16" HOLES
BEND ON ALL DOTTED LINES
WILL MAKE 1/8" SINGLE HEM ON BAR FOLDER
FIG. 16
PATTERN OF TRAY - MAKE ONE
DESIGN FOR DECORATION OF PENCIL HOLDER
PENCIL HOLDER & TRAYS
FIG. 15
DRILL 11/32" HOLES
1/8" CHAMFER
WOODEN BLOCK TO HOLD PENCILS - MAKE ONE
FIG. 14
BASE OF WOOD - MAKE ONE
FIG. 17
CUT
CURVE CENTRAL SECTION & SOLDER TO THESE CURVED LINES
SMALL TRAYS - MAKE TWO

Details of pencil holder and trays

7. To make the small curved-bottom trays, transfer the pattern to the tin from a paper pattern, using a sharp scriber. Cut out the trays with a pair of tin snips.

8. Turn the ⅛-in. hem on each edge.

9. Curve the bottoms over a mandrel or a piece of pipe held in a vise.

10. Bend up the sides and solder all joints.

11. Paint and decorate the project.

TILE-TOP TABLE

HOMER C. ROSE

Falls Church, Va.

The small table shown in Figure 1 is designed to provide the builder with experience in a variety of operations, ranging from brazing to tile setting. The table is very popular and has the advantage of being usable indoors or out. It has the added advantage of being acceptable with other furniture of wood or metal whether of traditional or modern design.

Suggested Procedure

1. Cut the sides and ends of the top to length and with 45-deg. mitered corners.

2. Clamp these pieces square to each other and weld or braze the corners. Welding or brazing is suggested for all joints in this project.

Fig. 1. Tile-top table

3. Cut the stock for the legs from mild steel and square the ends.

4. Bend the curved parts with the aid of a vise and a suitable hammer. In bending these pieces it is suggested that each piece, as it is bent, be clamped in the vise with 1½ in. projecting from the vise jaws. This will aid in making identical bends.

5. Chamfer all corners that will be part of a joint.

6. With the top of the table face down clamp the straight leg pieces in place and weld or braze to the top. Check for squareness.

7. Place the horizontal side and endpieces and weld or braze.

8. Weld or braze in the small vertical pieces.

9. Clamp the curved piece using a spacer of ¼-in material to help locate it properly and weld or braze as in Figure 3.

10. Weld or braze in the remaining leg pieces.

11. Fit the sheet metal piece to the top. It is not necessary to braze this.

12. Finish all metal parts as desired.

13. Select and arrange the tile to form a pleasing pattern as shown in Figure 4.

14. Mix Keene cement according to direc-

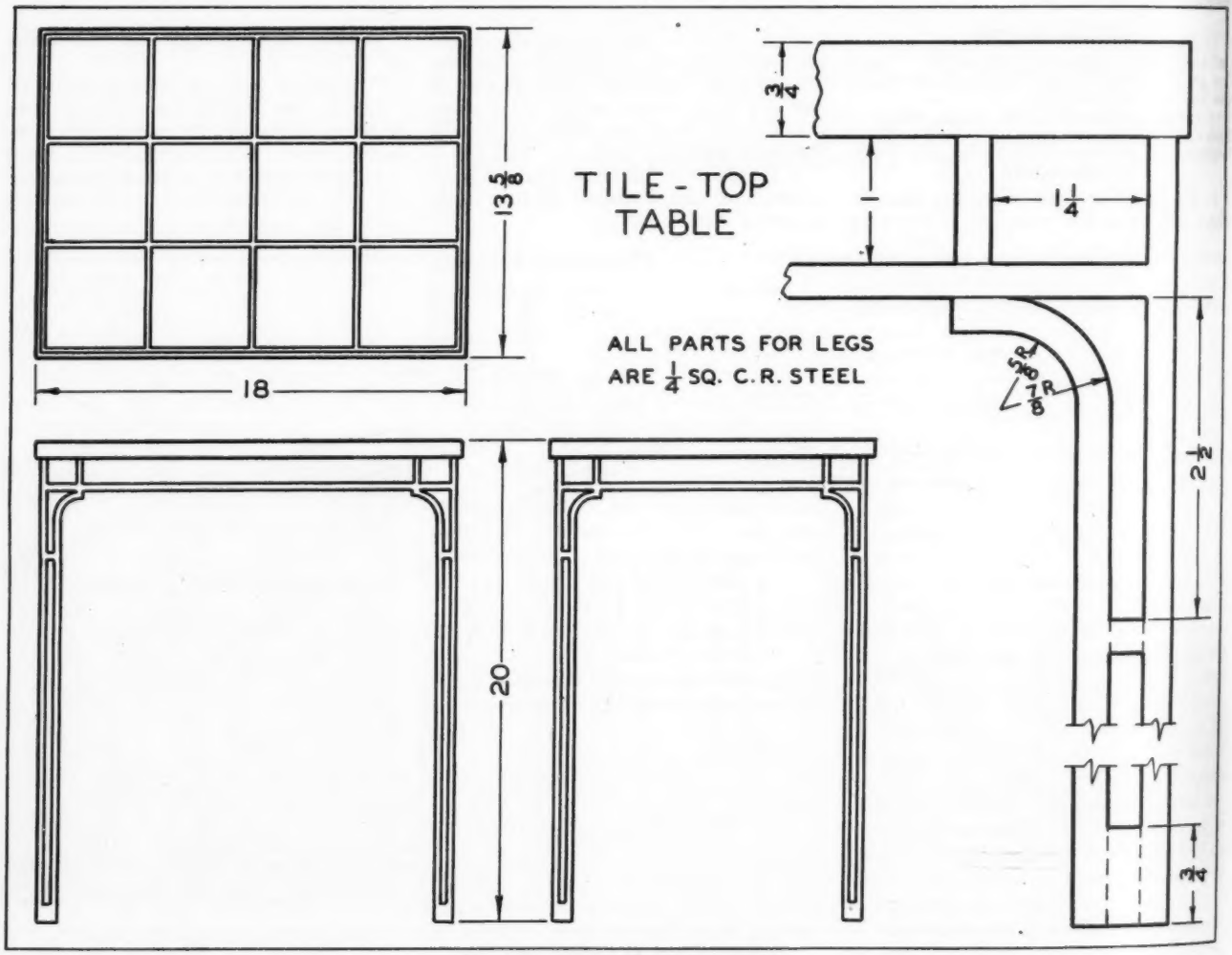


Fig. 2. Details of tile-top table

BILL OF MATERIALS

No. of pcs.	*Name*	*Material*	*Length*
2	Side	¾-in. angle iron	18 in.
2	End	¾-in. angle iron	13⅝ in.
4	Straight leg piece	¼-in. sq. mild steel	19¼ in.
8	Curved leg piece	¼-in. sq. mild steel	18¾ in.
2	Sidepiece	¼-in. sq. mild steel	17¼ in.
2	Endpiece	¼-in. sq. mild steel	12⅞ in.
8	Leg top pieces	¼-in. sq. mild steel	1 in.
8	Lower leg pieces	¼-in. sq. mild steel	¾ in.
8	Spacer	¼-in. sq. mild steel	¼ in.
1	Top	20-g. iron	13⅜ x 17¾
12	Tile	Keene cement	

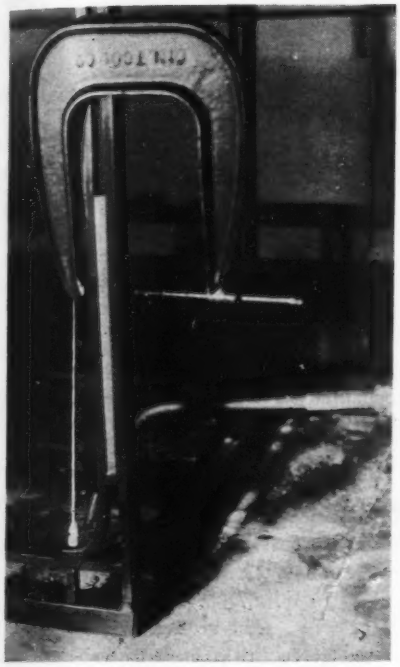


Fig. 3. Brazing the leg joints

tions and fill the space to within ⅛ in. of the top of the angle iron.

15. Set the tile being sure that all spaces between tile are filled with cement.

16. Check the tile for straightness with an appropriate straightedge.

17. Remove all excess cement.

Alternatives

A light-gauge corrugated iron or aluminum piece may be used under the Keene cement. The corrugation will save cement and decrease the weight of the table. Space should be allowed for a thin layer of Keene cement between the top of the corrugated piece and the bottom of the tile.

A glass top may be substituted for the tile. This does not need to be fastened in.

Wood, linoleum, or imitation leather over plywood offer possibilities for variation in the design.

Coloring the metal with heat is perhaps the most common finish. However, some have preferred to enamel the steel or to polish it and then protect the surface with lacquer.

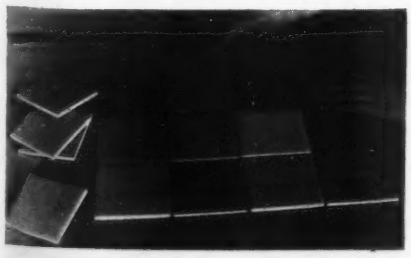


Fig. 4. Preliminary selection and layout of tile, using cardboard dividing strips

CAN A COLD CHISEL BE SHARPENED WITH A FILE?

J. H. McCLOSKEY

High School

Lakewood, Ohio

For a number of years, in connection with lectures and demonstrations on the heat treatment of chisels and punches, I have been asking my beginning classes in metalwork this question: "Can one sharpen a cold chisel with a file?" I have also had the students take home a slip of paper with this question so their fathers or older brothers could give their answer to it. After the answers are in from the students and their parents, the data is compiled and then the results are announced. Working in various machine shops during the war, the same question was asked of probably 200 machinists. In about 90 per cent of the cases their answer was "no." Industrial-arts teachers, in many instances, give the same answer, and students are wrong more than 90 per cent of the time. Having the answers from students and parents on record gets many of the pupils into a more teachable frame of mind and probably helps all to retain longer what they learn.

The following is given in answer to the question:

1. A cold chisel is made of 80 point carbon steel while a file is made of 125 point carbon steel. The more carbon in tool steel, the harder the steel can be made.

2. A cold chisel is heated to the proper hardening heat and quenched in lukewarm water. The file is heated to the proper hardening heat and quenched in brine which cools the file much more quickly. The quicker the heated steel is cooled, the harder it becomes. This is the second reason why the file is harder than the chisel and should be able to cut it.

3. The cold chisel is tempered or toughened by permitting the cutting edge to be reheated to about 550 deg., i.e., to a blue color. The file is not tempered. This is the third reason why the file is harder than the chisel and being harder should cut it.

It can be proved that the file is much harder than the chisel by testing it with a machine made for testing the hardness of metal. Using a Rockwell tester, a file will test about 65 on the C scale while a cold chisel will test about 55. The file, being decidedly harder than the chisel, should be able to cut it.

Having given three reasons why the file should be much harder than the chisel and having shown that it actually tests harder, I take a new chisel from a box, grip it with the facet parallel to the floor and about ¼ in. above the vise jaw. Then I take a used, second cut, ten-inch file from the rack and demonstrate how easily a file will cut a good cold chisel. Afterward some of the boys are allowed to try their hand at filing.

An outstanding manufacturer of cold chisels gained considerable prominence by having salesmen drive their chisels through a thick piece of iron and then file it while still projecting through the iron. This impressed onlookers with the fact that these chisels were exceptionally good. This was true, but the same could have been done with any good chisel. In fact a cold chisel that cannot be filed would be a dangerous tool to use.

However, the most convenient and quickest way to sharpen a cold chisel is to grind it, but when a grinder is not available a file can be used. Occasionally a much more accurate job can be done with a file. This also is true when fitting up a screw driver. A scythe, sickle, scissors, hatchet, ax, most kitchen knives, and large numbers of tools, when quite dull, also can be filed to a cutting edge before whetting if a grinder is not available.

MIRROR BRINGS SHOP DEMONSTRATION TO AUDIENCE

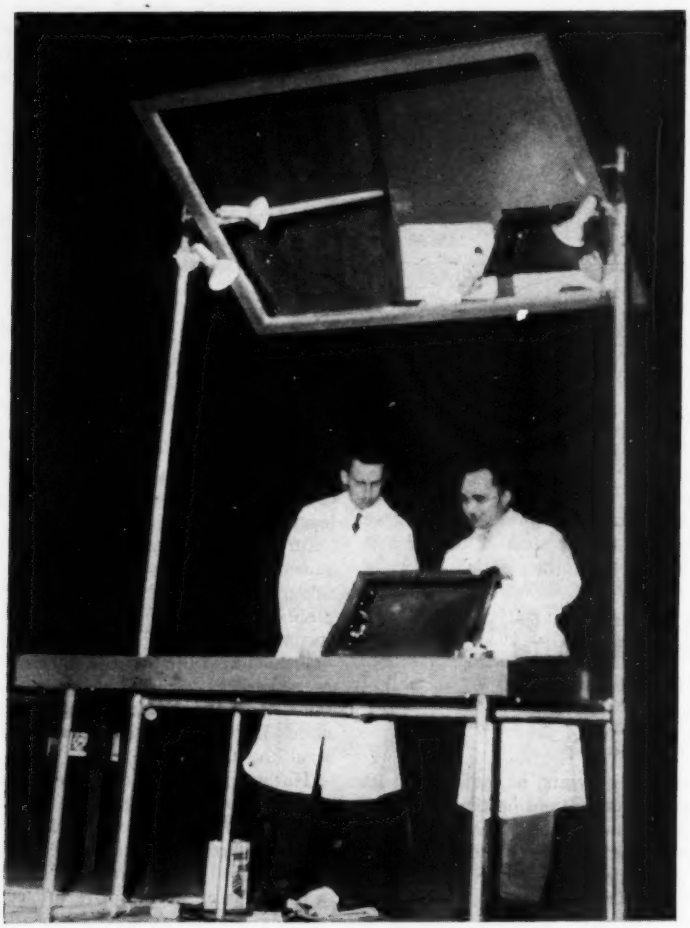
EVERETT M. BROWN

Burlingame, Calif.

Highlighting the annual California Industrial Education Association Convention at San Jose, Calif., April 23 and 24, was a sparkling series of four How-to-Do-It demonstrations by the Northern California Shop Teacher's Demonstration Team from Sacramento. This new idea of bringing the expert craftsman at work before a large audience is made possible by a mirror above the demonstration table and works very much like a rear-view mirror in your car.

The idea originated two years ago in the inventive minds of two top-notch industrial-arts instructors, Ed Jacobs of South Pasadena High School and Gordon Funk of North Hollywood High School. Convinced that shop institutes and conventions need more "shop" and less "convention," they set about to bring in some action and to make it plainly visible to all.

The accompanying photograph shows the



Mirror aid brings shop demonstration to audience

mirror in use at the San Jose convention with Dan C. Lopez and his assistant, James Kelso, of Sacramento, demonstrating the silk-screen printing process in making some shop safety posters, a stencil method of reproduction using cut paper. A special commercial film can also be used to make a stencil.

After a brief introduction, Lopez showed several posters in various stages of completion made by members of his junior high classes. Then clearing the table, he set about demonstrating the final steps of the silk-screen process. The entire audience could clearly see Lopez as he deftly mixed the pigments, laid the poster in place, squeegeed on the ink, then withdrew the poster in full brilliant color from the screen. The ease and perfect clarity with which each member of the audience could follow the demonstration, was attested by the spontaneous burst of applause when he completed his demonstration.

Also demonstrated with the help of the mirror was a showing of "Ceramics and the Potter's Wheel" by Robert E. Lynch, "Modern and Functional Design for Shop Teachers" by Earl E. Rooney, and "Art Metal Techniques" by Jack C. Reynolds.

Following the demonstrations the mirror and its supporting frame, made of pipe and pipe fittings, was disassembled in a matter of minutes, and together with the demonstration equipment was transported to automobiles for its return journey to Sacramento.

NEW COURSE IN PULP AND PAPER TECHNOLOGY

DEYO B. FOX

Director, Division of Vocational and Practical Arts Education

Western Michigan College

Kalamazoo, Mich.

Pulp and paper technology is the name of a new vocational curriculum to be presented at Western Michigan College at Kalamazoo. It is a new four-year technical and scientific curriculum, designed to prepare students for work in technical and manufacturing, sales and executive areas of the paper industry. It leads to the degree of bachelor of science. The curriculum, which will begin with the fall semester of 1948, has been developed co-operatively by the college and the technical men in the industry in the Kalamazoo Valley. No other Michigan college offers this particular kind of program for the paper-making industry, although a similar undergraduate instruction is given at the University of Maine and the New York State School of Forestry. The Western Michigan College plan of instruction is foundational in nature. It is not an engineering program, but it provides for actual work experience during the summer vacation periods in the paper industry. New papermaking laboratories will be housed in a new classroom building now under construction.

Dr. Alfred H. Nadelman, nationally known in the paper industry, has been appointed to the position of professor of pulp and paper technology and will head the work at Western Michigan College.

Dr. Nadelman comes to Kalamazoo from Niagara Falls, N. Y., where for the past four years he has been technical superintendent and chemist for the International Paper Co. Prior to this, he has held a number of important positions since coming to the United States from Germany in 1938. A native of Germany, he is now an American citizen. During World War II he served as gas instruction officer for the Council of National Defense, Philadelphia, Pa.

The new curriculum at Western Michigan College operates with the aid of an advisory committee, seven members of whom are from the paper industry, and two from the college.

INDIAN SILVERSMITHING

BEN HUNT

Hales Corners, Wis.

(Continued from page 288 of the September, 1948, issue)

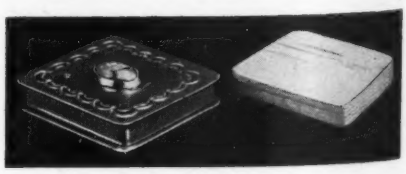
Silver Boxes

Among the articles made by modern Indian silversmiths are various types of boxes, some of which are so small that they can be used only as pill boxes or for postage stamps, while others are large enough to serve as cigarette cases or for other similar purposes.

For making the smaller boxes, 24-g. silver will be about right. Probably the simplest way to make them is to construct them in two parts, the one fitting over the other, so that no hinges need to be used.

Steps 1, 2, 3, 4, 5, and 6 in Plate 28 show how to proceed in making one. First cut and shape a piece of wood equal in size to the inside of the box. Around the outside of this form, wrap a strip of 24-g. silver, and cut it so the two ends make a flush butt joint, as shown in step 2, Plate 28. Then take another strip of silver, and shape it around the first strip, cutting off the ends so they, too, make a snug butt joint. See step 3.

Step 4 shows the set-up for soldering. If the



Small silver box

...ng. If the ...oo, make ...another ...joint, as ...e of this ...nd cut it ...so that ...28 show ...cut and ...e to the ...the first ...

...g. silver ...lest way ...in two ...

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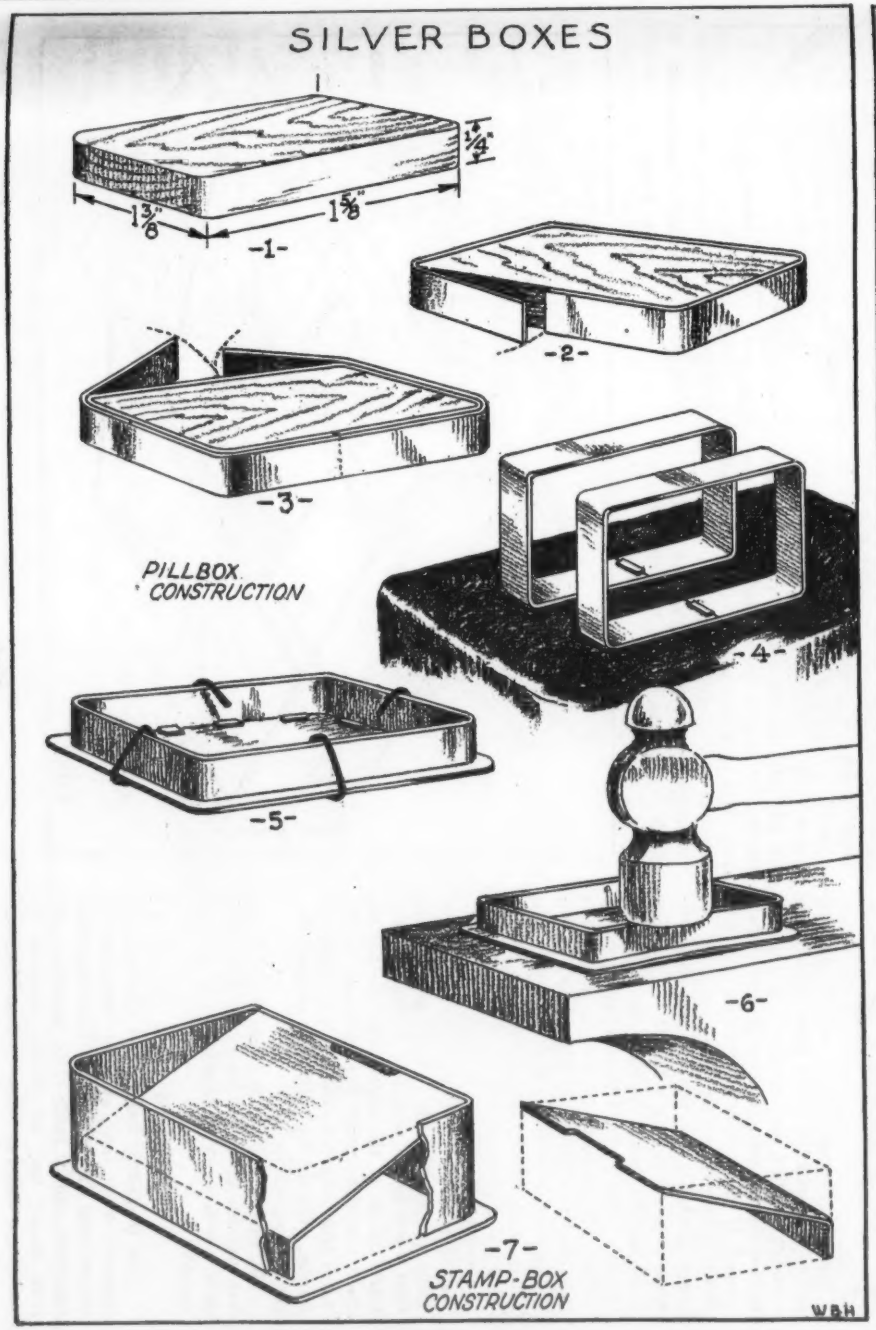


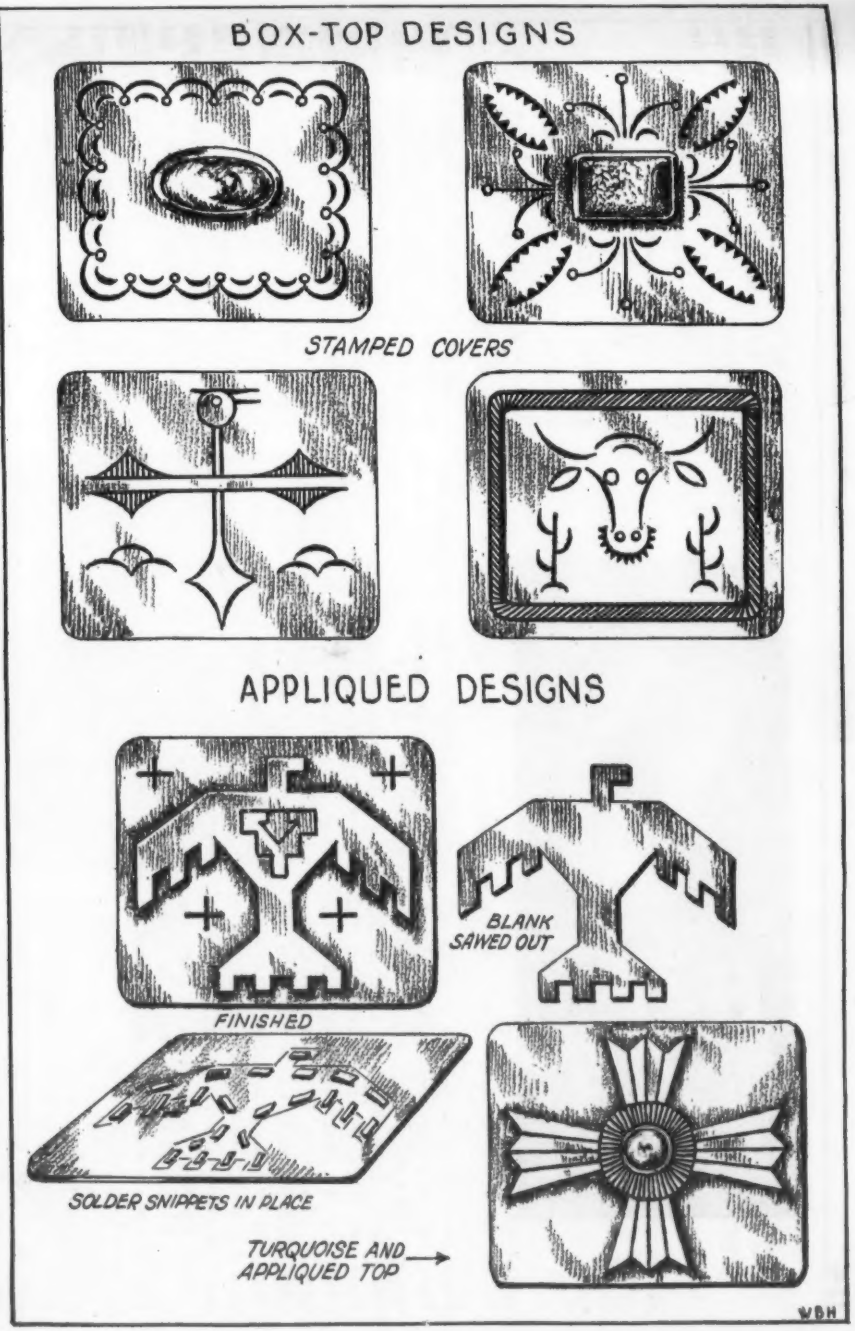


Plate 28

Plate 29

Silver pill box

pieces have been bent to shape carefully, no wiring will be required for soldering. Use a medium solder on the job, and, after it has cooled down, dress down the solder at the joints and check the fit between box and cover. The two should fit snugly with just a little bit of friction. If they fit too tight a slight amount of filing on the inner one may answer the purpose, or the silver in the outer band may be stretched by hammering lightly along the sides that are too short.

After the proper fit has been obtained, the top and bottom of the box should be made. They should be cut so that they project ⅛ in. beyond each of the sides.

Plate 29 shows designs which may be used to ornament the top of the box covers. You are earnestly urged to make a design of your own, or you can adapt the designs used on other pieces of silverwork in this series of articles.

The cover must, of course, be stamped before it is soldered to the sides. Due to the stamping, cutting, or annealing, the top and bottom pieces quite frequently are slightly warped. If they cannot be flattened out to fit tightly to the sides, they may be wired together as shown at 5, Plate 28. As shown, the wires go across from side to side and are then bent over the sides. An easy flowing solder should be used for this last soldering operation.

Next cut the edges of the top and bottom pieces so that they overhang the same amount. A slight amount of warp due to the tight wiring or to slightly uneven surfaces, may be corrected as shown at 6 in Plate 28. Be sure to tap very lightly with the hammer.

At 7 in Plate 28 is shown a stamp box. These are usually made ⅝ or ¾ in. high. The slant insert shown should be provided with a small cutout at the upper edge so that the insert can be removed. The lower part of this box is large enough to hold quite a number of stamps, while the top will hold a smaller number for immediate use.

The covers of boxes as deep as the stamp box may be made as deep as the box itself, or it may be made to come down ¼ in. over the sides.

Appliqué Work

Quite frequently Indians use appliquéd ornaments, when they have no turquoise for ornamenting their silverware. These appliquéd ornaments can be made quite attractive, and their beauty may be further enhanced by stamping a design on them. At times turquoise is added to further ornament the applied part.

In preparing an ornament that is to be appliquéd, first draw the design. From this, make a template, and then trace it onto a piece of 20-g. silver with a sharp scriber. Then do the stamping and solder on the bezel if one is required. Next saw out the piece with a fine jeweler's saw and smooth up the edges with a file. Such a sawed-out blank is shown in Plate 29. Then place it in position on the cover and scribe a fine line around it to show where it is to be soldered. Apply flux to the top, and place snippets of solder along the inside of the scribed outline. See Plate 29. Flux the bottom of the ornament, and place it in position, and lay the top on a soldering screen because the heat should be applied to both pieces equally. As a rule if the two pieces fit together fairly well, the weight of the upper piece will be sufficient to produce a good sweating job. At times, however, it will be necessary to apply a slight pressure to force the two pieces together so that a good soldering job may be obtained. Of course, if both pieces that are to be soldered together are very light, pressure will have to be applied from the very start.

Another method of sweating two pieces together is flux one side of the smaller piece, place the solder snippets upon it, and then heat it just enough to melt the solder. Then after fluxing it, place it in position on the other piece and apply the heat until the two pieces are properly sweated together.

V-BLOCK SAW JACK

VINCENT J. A. DAVIES
Instructor of Industrial Arts Education
Mynderse Academy
Seneca Falls, N. Y.

This dowel type of V-block saw jack, used for supporting work while sawing with a coping saw or jeweler's saw, has several advantages over the usual tenon type. It assures a permanent fit thus eliminating loose-fitting, worn tenons; it eliminates clothes-catching cleats under the edge of the bench; and it makes possible the use of thinner stock from which the saw jack is to be cut.

The V-Block

1. Select a piece of hardwood stock at least 1 in. thick. Cut the block to the size and

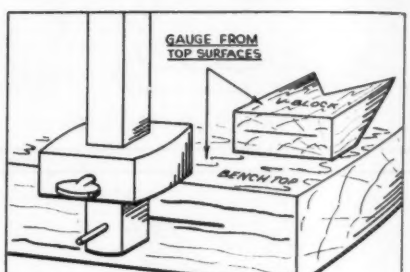


Fig. 2. Method of laying out center lines

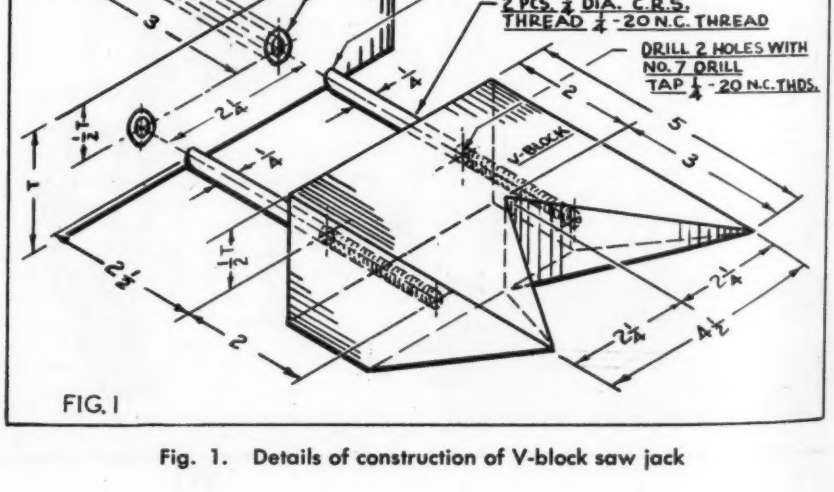

DRILL 2 HOLES
INSERT 2 PCS. ¼ I.D. x 3 PIPE
CHAMFER WITH PIPE REAMER
CHAMFER END
2 PCS. ¼ DIA. C.R.S.
THREAD ¼ - 20 N.C. THREAD
DRILL 2 HOLES WITH NO. 7 DRILL
TAP ¼ - 20 N.C. THDS.
BENCH TOP
V-BLOCK
FIG. 1

Fig. 1. Details of construction of V-block saw jack

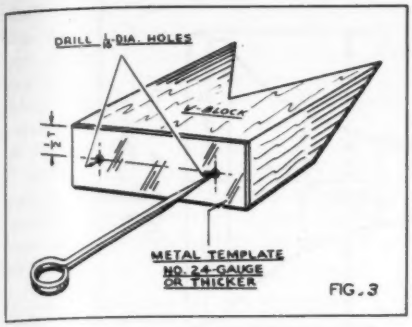


Fig. 3. Method of laying out centers with metal template

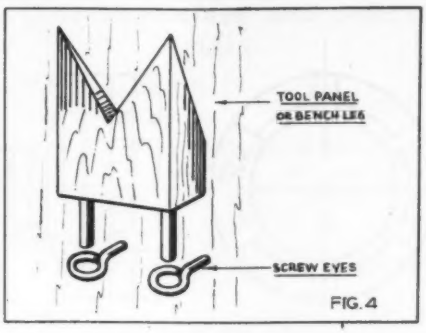


Fig. 4. Mounting V-block saw jack on tool panel or bench leg

shape shown in Figure 1, or to any size and shape suitable to the individual needs.

2. With a marking gauge lay out a center line equal to one-half the thickness of the block along the back edge of the block and along the edge of the bench using the top surface of each as the gauging surface. This is shown in Figure 2.

3. The centers for drilling may be marked along the center lines with dividers, or a template may be made like the one shown in Figure 3, which may be retained on file for future use in making replacements.

4. Drill two holes 2 in. deep on these centers with a No. 7 drill.

5. Tap these holes with a ¼-20 NC thread.

The Dowels

1. For the dowels secure two pieces of ¼-in. diameter cold rolled steel each 4½ in. long.

2. Chamfer one end of each piece on the lathe with a grinder or with a hand file.

3. On the opposite end of each piece thread the dowel with a ¼-20 NC thread for a distance of 2 in.

4. Screw the dowels into the block.

The Bench Bushings

1. The bench bushing or inserts are made from two pieces of ¼-in. inside-diameter pipe each 3 in. long.

2. Ream one end of each piece with a pipe reamer to facilitate insertion of the dowels.

3. Cut a chamfer on the opposite end of each piece of pipe on the lathe, grinder, or with a hand file.

4. Carefully measure the outside diameter of the pipe and select an auger bit or twist drill about 1/64-in. less than the O.D. of the pipe.

5. Drill two holes to a depth of 3¼ in. in the edge of the bench on the centers previously located.

6. Drive the two pieces of pipe into these holes with a wood or lead mallet.

NOTE: Some type of lubrication on the inside of the pipe will prevent corrosion and facilitate insertion and removal of the V-block saw jacks.

Storage

When not in use the V block may be conveniently mounted on a tool panel, bench leg, or bench door by fastening two screw eyes on a horizontal center line the correct distance apart through which the dowel pins are inserted as shown in Figure 4.

Fig. 5. Mounting the V-block saw jack on the bench

INFORMATION WANTED ON HEATING AND VENTILATING COURSES

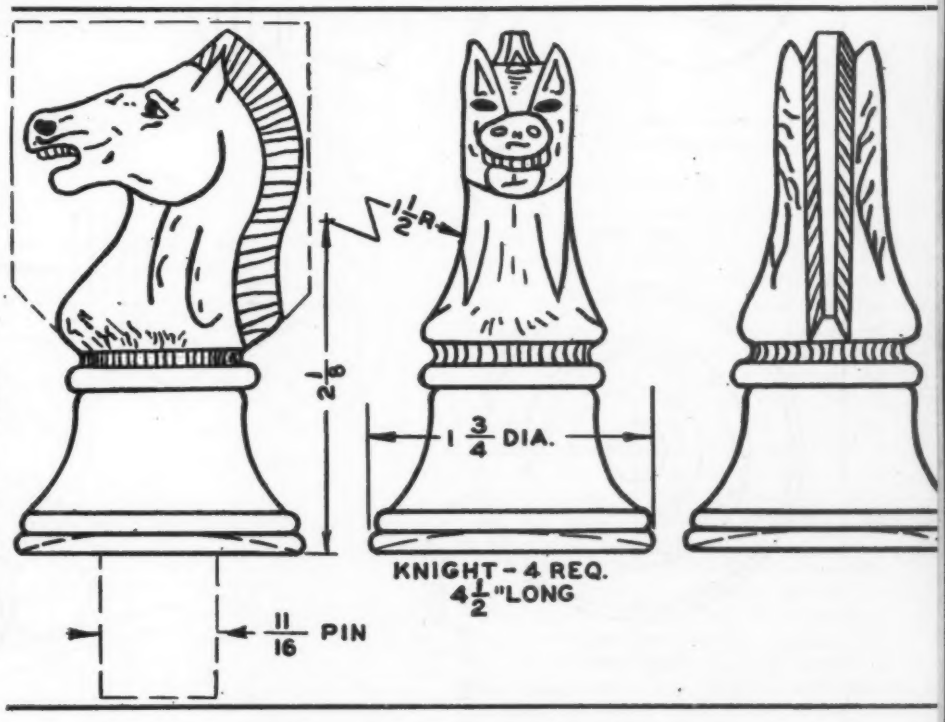
Because of the large number of inquiries that are received by The Industrial Press, 140–148 Lafayette St., New York 13, N. Y., publishers of "Heating and Ventilating," requesting information on vocational schools that give courses in heating, ventilating, air conditioning, and refrigeration, we are making a survey to determine just what schools are giving such courses and, also, details regarding instruction.

Schools offering such courses are kindly asked to co-operate by sending the required information to the given address.

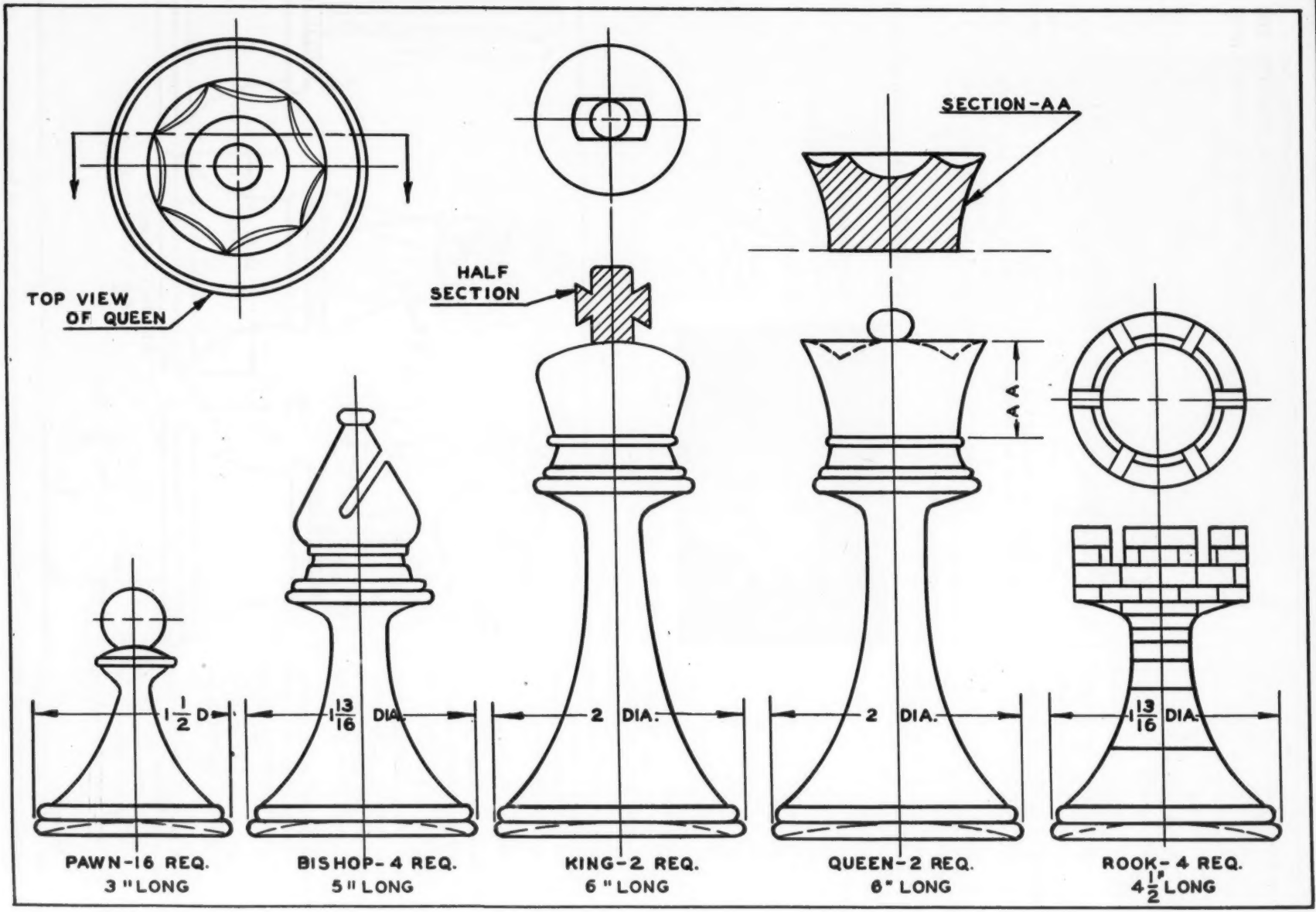
CHESSMEN — A WOODWORKING PROJECT

JOHN EMMEL
Connelley Vocational High School
Pittsburgh, Pa.

Pieces are turned out of maple or birch. All pieces are shown full size and dimensions should be taken directly from the print. The dimension under the piece is the length of stock necessary to make that piece. Dish all bottoms out about 1/16 in., and the pieces will set flat, due to their resting on the circumference of the base. The queen crown is



Chessmen — full-size patterns of knight



Chessmen — full-size patterns

made with a round file. The King's cross is filed out of the cylinder left on the top. The slot in the bishop's miter is simply a wide saw cut. The knight is the most difficult job. Leave the pin in the base until completely finished. This is to clamp it in the vise. Turn to the cylinder shown by the broken lines. Then saw to the curves on the sides. Sketch profile of head on flat surface and then saw out contour of head. Then file and chisel ears, eyes, mane, nostrils. When finished, cut pin off base.

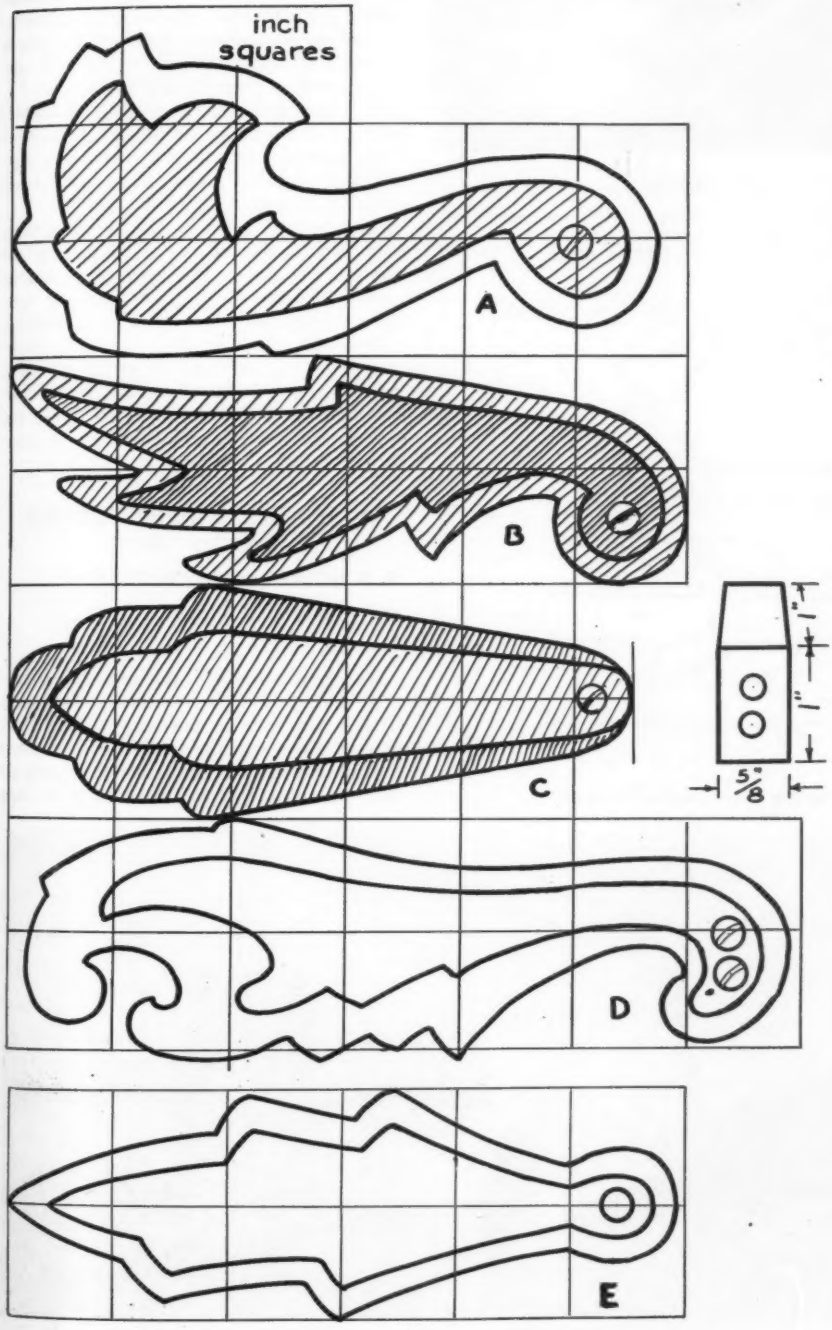
CURTAIN HOLDERS AND SHADE PULLS

HAZEL F. SHOWALTER

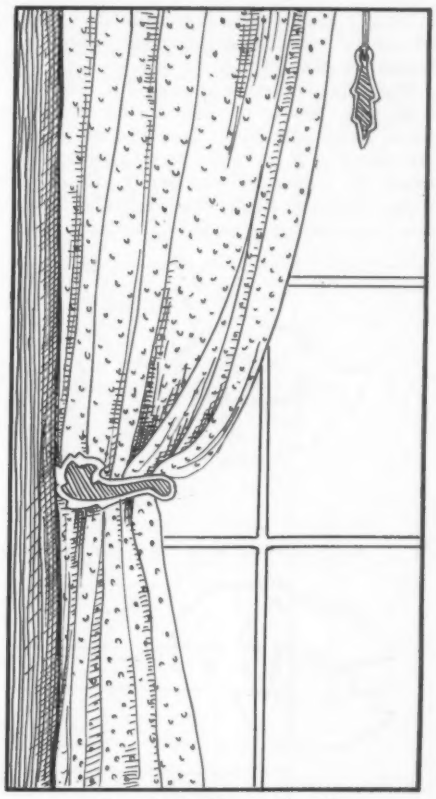
Davenport, Neb.

The four patterns for curtain holders, or tiebacks as they are often called, are to be used in reverse for the second member of the pairs to be used at opposite sides of the windows.

Pattern *C* will serve also as a pattern for a shade pull to make a matched set of three pieces. Pattern *E* is to be used for a shade pull to accompany each of the curtain holders, *A*, *B*, and *D*. Pattern *D* is large enough to be used for a holder of heavy draperies if drawn in inch squares; if drawn in ¾-in. squares it will be suitable for use with lace curtains. Patterns *A* and *B*, if intended for use with unusually small or delicate lace curtains, should be drawn in ⅞-in. squares.



Suggestive patterns for curtain holders and pulls



Curtain holder and pull

Each design consists of two patterns by which shapes are to be cut separately from contrasting woods and glued together. The larger piece of each which serves as a back and frame for the smaller piece may be cut from either plywood or ¼-in. wood; while the smaller or inner piece should be cut out of ⅛-in. wood. The edges of the larger piece should be rounded faintly in sanding; the upper edge of the smaller piece should be well rounded with its under edge left sharp. Instead of two pieces of wood being used, a groove might be cut along the line of the smaller pattern on the larger piece and possibly stain used on the space enclosed by the groove.

The little block that holds the ornamental shape away from the window frame may be placed horizontally, vertically, or at whatever angle best suits the ornamental shape with which it is being used. A half inch should be added to its length if the holder is to be used for heavy draperies. One or two roundhead screws through the ornamental shape and the

little block will fasten the curtain holder to the window frame. The placing of the screws makes them seem a natural part of the design rather than a blemish.

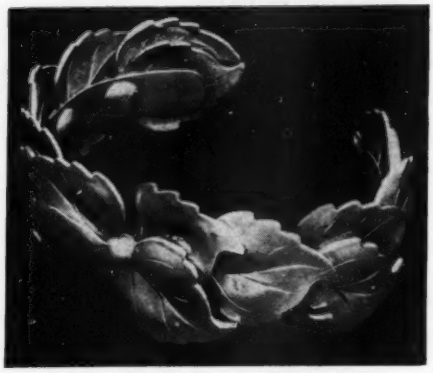
MULTIPLE-LEAF ALUMINUM BRACELET

SIMON S. PALESTRANT

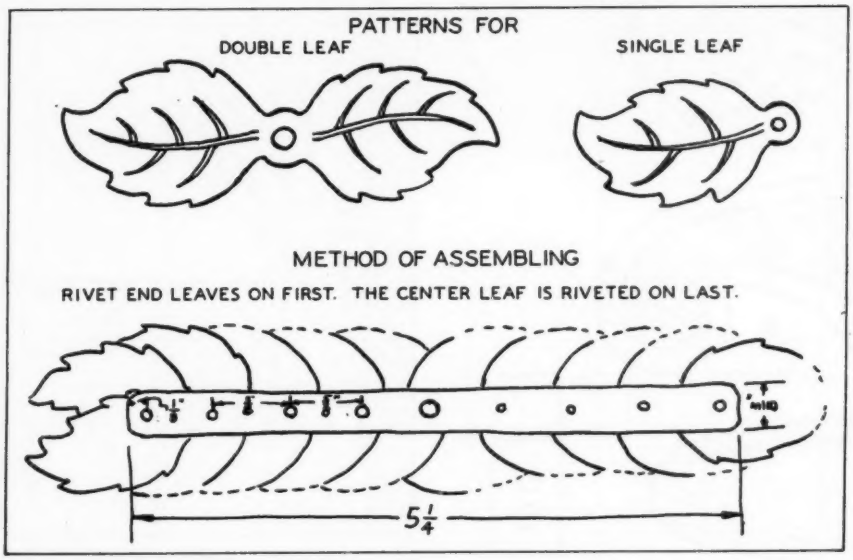
Bronx, N. Y.

Twenty metal leaves riveted in a row, ten on one side and ten on the other, makes an interesting piece of costume jewelry.

The aluminum leaves are cut ½ in. wide by 5 in. long. Sixteen of these are cut as individual leaves with ¼-in. stems through which are drilled 1/16 in. holes for the rivet with which the leaves are attached to the ⅜-in. spring aluminum band. The illustration shows how two leaves are attached to the band, both pointing toward the end of the bracelet. The leaves are set in sequences of two overlaid much the same as feathers or fish scales do.



Multiple-leaf bracelet



Patterns and method of assembling the multiple-leaf bracelet

The center four may be used as individual leaves arranged as a cross or as twin leaves joined together at the stem. These are crossed as a four-bladed propeller might look. A rivet is used to fasten these together to the main band with its specially large bead facing the leaf side on top of the bracelet.

Before these leaves are fastened in place it is possible to anodize the metal to produce various colored leaves. The leaves are first oxidized by dipping them into a mild soda solution such as lye (potassium or sodium hydroxide will do). This coating of aluminum oxide takes aniline dye very well. The intensity of the color deposited depends on the length of time the metal is left in the dye bath and on the concentration of the dye solution.

If aniline dyes are not readily obtainable, see your local chemist or druggist. The common antiseptics such as mercurochrome, gentian violet, brilliant green, scarlet, etc., are all dyestuffs as well.

Scratches and other surface blemishes must be removed and the metal polished before oxidizing is started. All surface decoration such as chasing, shaping, and stamping must also be done before the aluminum is oxidized.

When the entire bracelet has been assembled it is well to shape it gently around a bracelet mandrel. An alternative is to shape the ⅜-in. strap after the holes are drilled and then attach the rivets. Greater care is necessary in doing it that way.

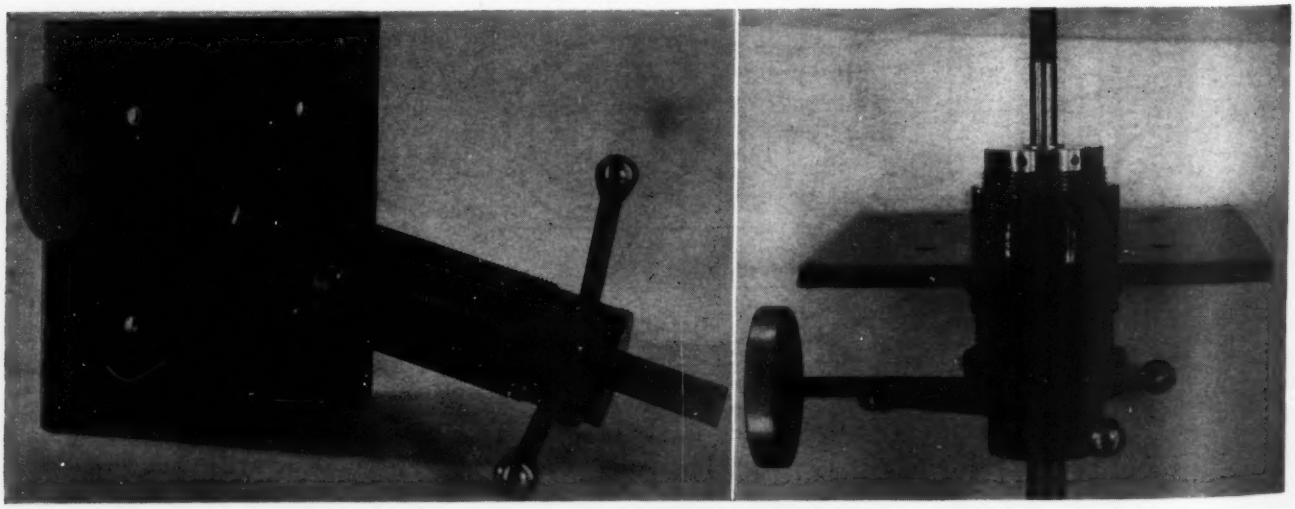
A SPINDLE SHAPER FOR THE WOOD SHOP

A. SCHIELKE and J. DONNELLY

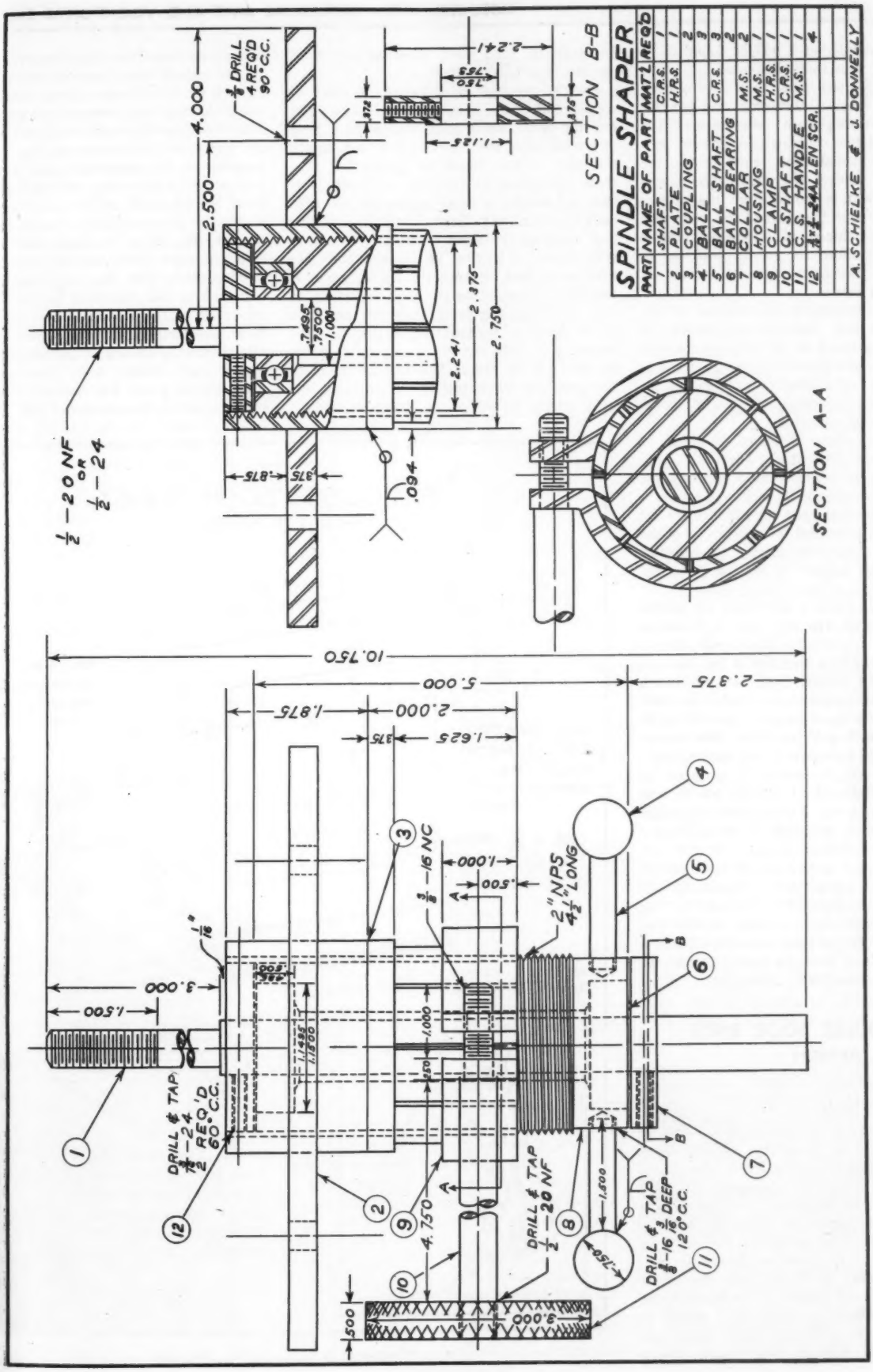
State Teachers College

Trenton, N. J.

The construction of a spindle shaper by students will enliven any machine shop course. The project, with its simplicity of design, may be correlated with the drafting classes where detailed drawings of the individual parts are made and then worked out in the machine



Two views of the spindle shaper



Homemade spindle shaper

shop. Upon completion it will be found to be a valuable piece of shop equipment.

Two weld-jointed pipe couplings obviate the task of internal threading and provide for vertical-cutting-depth adjustments. The threads of the two couplings are aligned on a section of threaded pipe, upon which the couplings are welded, after which the pipe is removed. It will be noted from the accompanying illustration that part of the lower pipe coupling is machined to a smaller outside diameter. This allows for greater flexibility of the part with the eight segments formed by four hack-saw cuts.

The spindle housing is lathe turned to 2-in. pipe diameter size, and external threads are then either machined on the lathe or cut with a 2-in. NPS pipe-threading die. A force-fit bearing recess is machined on each end of the housing, and a 1-in. hole is bored its full length to permit spindle clearance.

The locking clamp is forced to shape as indicated in the illustration. The back upper edge has a 1-in. segment weld securing the clamp to the coupling in its relative position.

After the finished parts are checked by the instructor and assembled the appearance of the unit may be improved greatly by painting, using the color scheme of machinery in the wood shop.

The completed unit is now ready for service in the wood shop. The steel plate is bolted on the underside of a woodworking bench, after a 2¾-in. hole has first been bored for the coupling to extend through flush with the bench top. A 1/3-horsepower electric motor mounted on end will, for most purposes, provide sufficient power with a V belt drive. For heavy-duty work, a ½ horsepower is recommended.

The utility of the shaper is increased by threading the spindle 24 threads per inch as the drawing indicates. This permits a standard ½"–24 chuck to be attached for holding a buffing wheel and drum sander.

A class project of this nature tends to encourage a keen competitive spirit among students and brings forth their best efforts. The phases of construction include various machining methods and shop processes of educational value, and develops in the student an appreciation of machinery in industry.

REPOUSSÉ BOOK ENDS

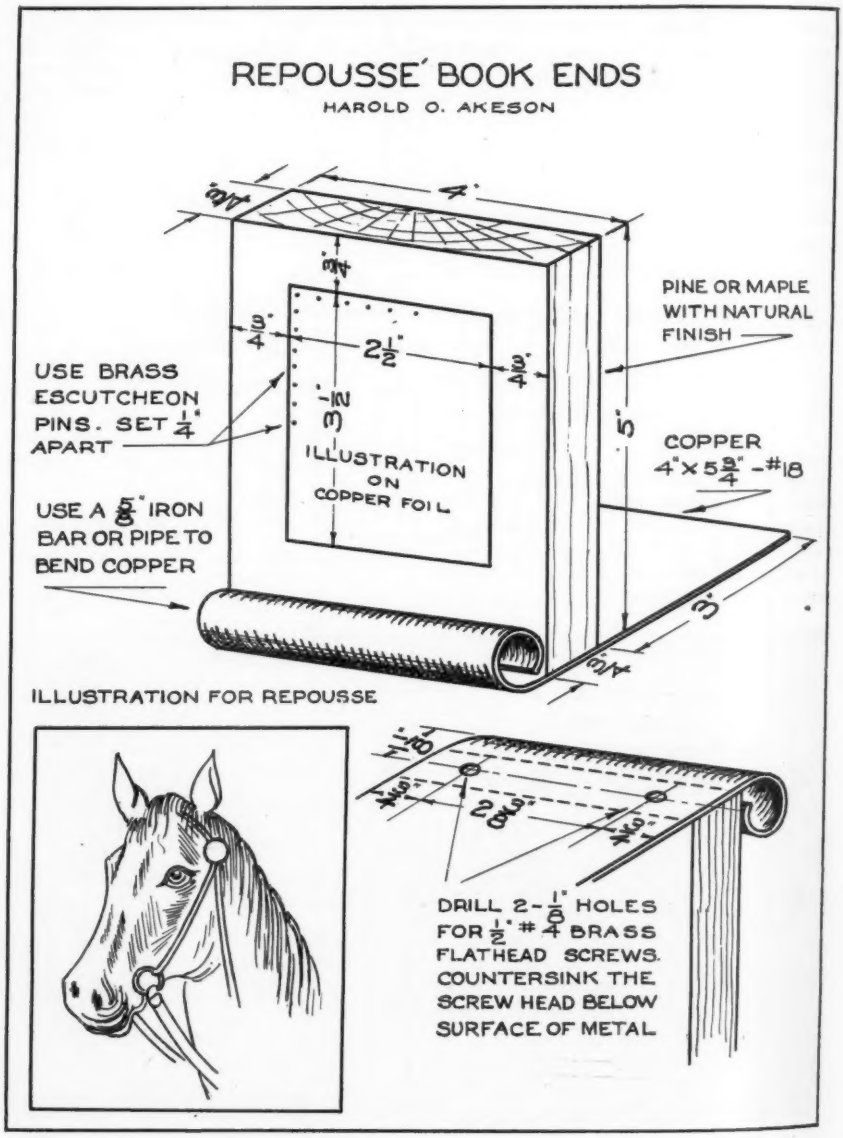
HAROLD O. AKESON
High School
East Orange, N. J.

The book end is an old project, but it is still in demand as shown by its continuous display with other merchandise in the stores. The following design offers processes that will give a number of experiences, and would also lend itself to correlation with the arts or crafts for a bit of repoussé.

First, get out the wood stock for the uprights. These may be of white pine, poplar, or maple, ¾ by 4 by 5 in. After preparing these pieces and sandpapering thoroughly, shellac or lacquer them for a natural finish. Apply two or three coats, rubbing down each with a fine grade of steel wool. After rubbing down the last coat finish with wax.

For the repoussé work prepare a piece of copper foil 3 by 4 in. for the design. The drawing of the horse head is made on a piece of tracing paper and fastened with four clips to the piece of foil. Place the copper foil on a thick newspaper, as padding, to obtain pressure for making a good impression. Go over each line with the pointed end of the modeling tool applying the same pressure as one uses with a pencil in writing. Be thorough and trace over every line for once the tracing paper is removed it can not be put back accurately to draw in the missing parts. They will then have to be filled in without the tracing. On the reverse side press out the parts that are to be in relief on the front. This is done by using the broad, or spoon, end of the modeling tool in a rolling motion which makes a smooth, concave surface. Turn the piece over and true up any uneven lines, being careful not to cut through the foil for now it has become hard, due to having been worked, and it therefore, is brittle. Trim the work to correct size to fit the space on the book ends and mark the locations for the escutcheon pins. In order to prevent the hollow part of the horse's head from buckling, fill with a stiff mixture of plaster of Paris before mounting it on the wood blocks. When mounted and nailed securely in place, rub down with fine steel wool, and lacquer it with clear metal lacquer.

In getting out the stock for the bases cut two pieces of 18-g. copper, 4 by 5¾ in. Square both pieces and drawfile the edges for smoothness. Clean the surface of the metal with fine, partly used emery cloth, to remove any scratches or mars. Do not use new emery cloth, as that is too sharp and stiff. The sand-


REPOUSSE' BOOK ENDS
HAROLD O. AKESON
4"
PINE OR MAPLE WITH NATURAL FINISH
USE BRASS ESCUTCHEON PINS. SET ¼" APART
ILLUSTRATION ON COPPER FOIL
COPPER 4"×5¾"-#18
USE A ⅝" IRON BAR OR PIPE TO BEND COPPER
5"
3"
ILLUSTRATION FOR REPOUSSE
DRILL 2-⅛" HOLES FOR ½" #4 BRASS FLATHEAD SCREWS. COUNTERSINK THE SCREW HEAD BELOW SURFACE OF METAL

Details of repoussé book ends

ing should be done lengthwise of the piece, pulling the abrasive one way, or else nothing is gained. The edges should be gone over at the same time, thus removing any sharp corners. Follow by polishing with fine steel wool. If a power machine is available, scratch brushing, followed by polishing may be used instead of the hand method. After the surfaces have been cleaned and polished do not let the hands touch them again. Handle the metal with a cloth or cloth gloves, if possible. Select one end of the copper and curve it around a ⅝-in. iron bar, pipe, or maple wood dowel, either in a vise or with a rawhide mallet. Keep the surface, that is to show, protected with thin cardboard while in the process of shaping. This part sounds complicated, but is necessary to protect the surface and can be done without too much difficulty. Do not quite complete the curve. See illustration. Repolish any part that needs it. Lay out the screw holes to fasten the metal to the wood uprights. Center punch and drill, using ⅛-in. drill. Countersink for flathead screws. Head of screw should be flush with metal and not protrude to scratch the surface which the book end is resting upon.

Assemble the parts and lacquer the base with two coats of clear metal lacquer.

BUD-VASE SCONCE

HOMER C. ROSE

Falls Church, Va.

Attractive small bottles are easily obtained and, when mounted on a suitable sconce, make interesting and useful wall vases for small flowers or vines. See Figure 1. Few dimensions are given for the sconce, as the design should be varied for each shape of bottle used.

Fig. 1. Bud-vase sconce

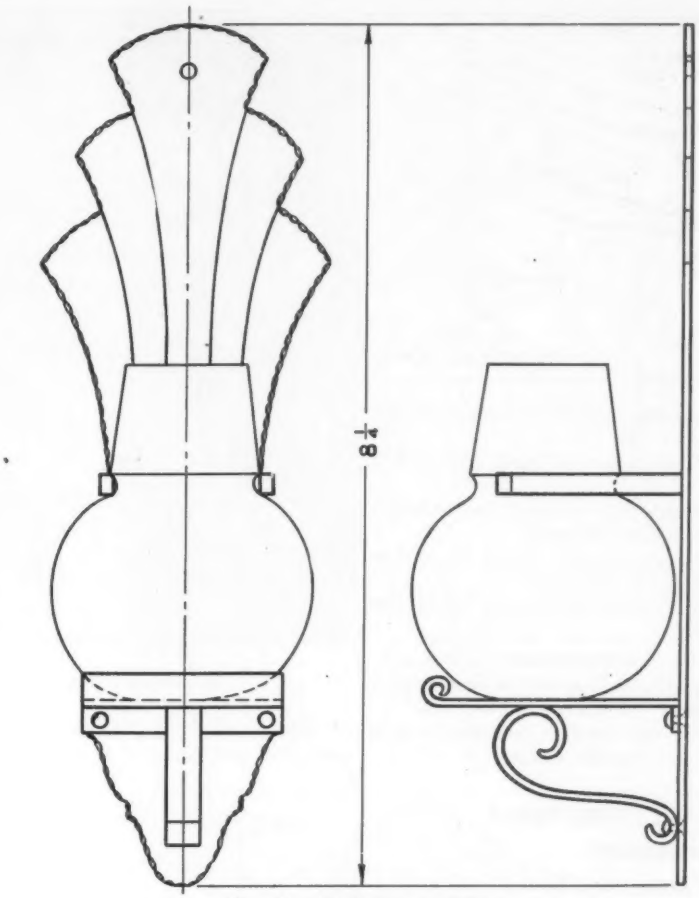


Fig. 2. Bud-vase sconce

BILL OF MATERIALS

No. of pcs.	*Name*	*Material*	*Size*
1	Back	Sheet aluminum	3/32 x 3 x 8¼
1	Shelf	Sheet aluminum	3/32 x 2 x 3½
1	Scroll	Sheet aluminum	3/32 x ½ x 5
1	Brace	Sheet aluminum	3/32 x ¼ x 6
6	Rivets	Aluminum r.h.	⅛ dia. x ¼

NOTE: Sizes given are approximate and should be checked against the design worked out in steps 3 to 6.

Procedure

1. Trace the outline of the bottle on heavy paper and cut to the line.
2. Lay this paper pattern on a sheet of drawing paper and trace around it.
3. Sketch on the backplate a design to match the shape of the bottle. See Figure 2. The shape of the plate should be carefully worked out.
4. Draw end view by projection.
5. Make layout pattern for each part needed, showing rivet holes, bending lines, etc.
6. Mount patterns on sheet aluminum with rubber cement.
7. Cut sheet aluminum to approximate size with tinner's snips or with sharp cold chisel and mild steel block.
8. File curved sections of the pieces to the line with fine half-round file. *Leave the line.* Keep the file clean with file brush. Use smooth copper or fiber vise plates to protect the work while it is being held in the vise.
9. File straight sections of the pieces to the line. Note that straight sections are filed after the curved.
10. Center punch for all rivet holes.
11. Planish all exposed surfaces.
12. Chase lines with chasing tool.

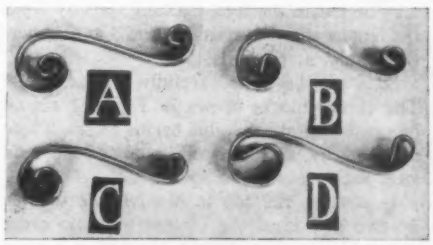


Fig. 3. Right and wrong in scrolls. Scroll *A* illustrates the only good form. Notice how the ends of the metal continue the curve rather than straighten out

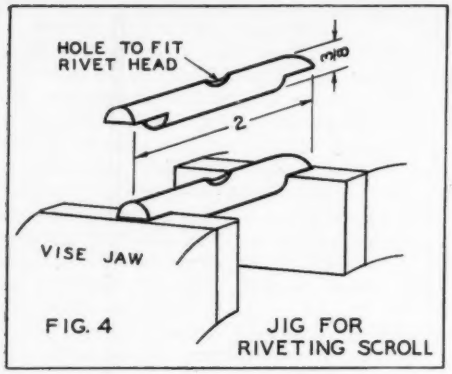


FIG. 4 JIG FOR RIVETING SCROLL

13. Form scroll with round nose pliers. See Figure 3.

14. Drill all holes with hand drill or drill press.

15. Assemble parts with r.h. rivets using a rivet set to protect the head.

16. A riveting mandrel should be used in riveting the scroll. See Figure 4.

17. Remove all tool marks with fine file and emery cloth.

Alternatives

Brass, copper, or iron may be used in place of aluminum.

If desired, the container may also be made of metal as a special problem.

COFFEE TABLE

W. L. DORRANCE

Whittier Junior High School
Lorain, Ohio

The coffee table shown in the illustration is a suitable project for the junior or senior high school student. In addition to the mortise and tenon joints, which will require careful work, the beading of the legs and rails will give training in the use of the shaper or of the combination plane.

Choose a good cabinet wood such as black walnut or red gum.

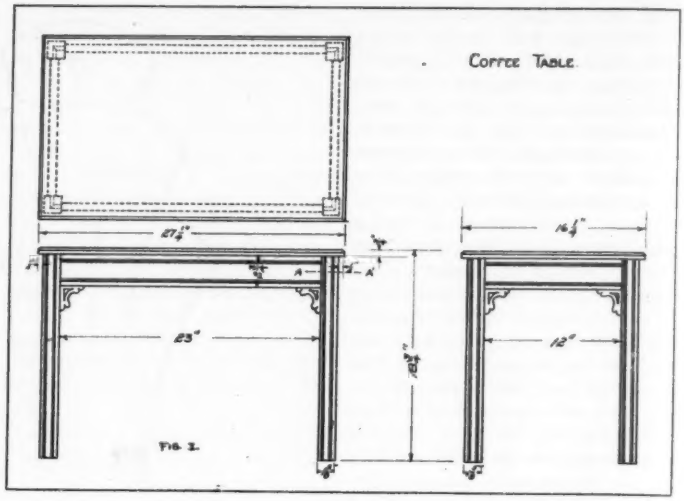
Figure 1 shows the general construction of the table. Plane the legs to size, after which the beading is cut on the outside surfaces of each leg. The details of the legs are shown in Figure 2.

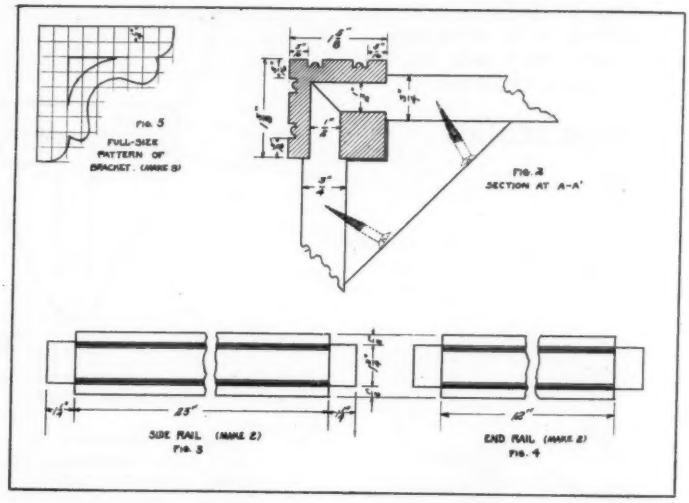
After the rails have been made, the mortises may be cut in the legs, marking directly from the tenons onto the rails. Figures 3 and 4 show the details of the rails.

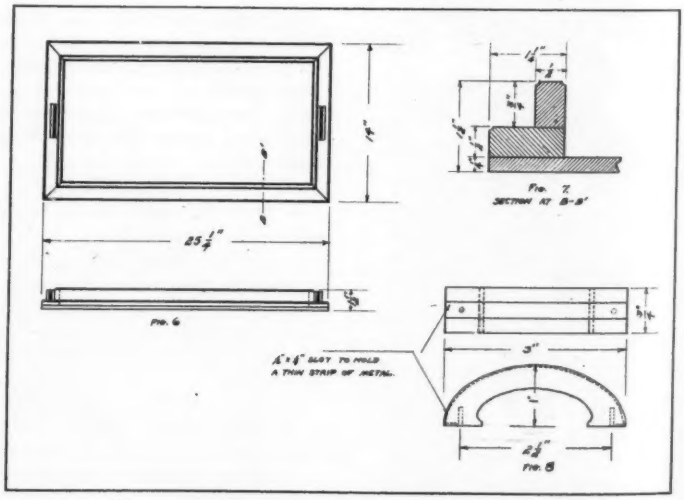
Sand all the parts carefully and assemble. The corner blocks shown in Figure 2 should be put on before the glue begins to set. These may first be fastened with brads and glue and later with screws.

In making the top it is advisable to glue up two boards of the desired width in order to avoid warping. The hand shaper is used around the edge of the top. The top is fastened by means of screws up through the corner blocks.

Figure 5 shows the pattern for the brackets. These are cut out on the band or jig saw from







Details of coffee table and tray

½-in. stock. Fasten in place with glue and brads.

Figure 6 shows the construction of the tray, the bottom of which is three-ply veneer. The hand shaper is used on the edges as shown in Figure 7. Assemble with glue and brads.

Figure 8 shows the handles of the tray which may be cut from wood or purchased already made.

After the work has been thoroughly cleaned and sanded, apply a coat of paste-wood filler. Finish with two or three coats of white shellac. Glue a piece of felt on the bottom of the tray.

METAL WALL SHELF

SIMON S. PALESTRANT

Bronx, N. Y.

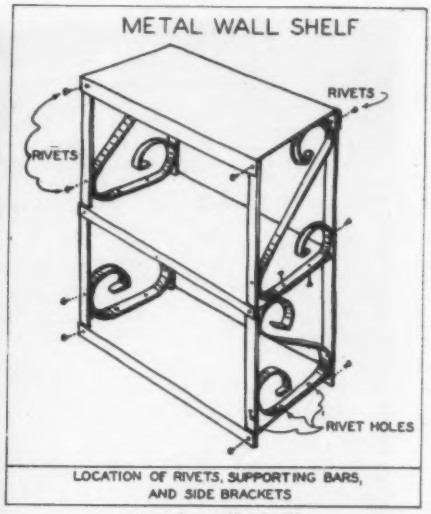
The wall shelf described in this article can be made with minimum equipment and with materials that are readily obtainable. Some rivets, ⅛-in. band iron, some tinplate, or other sheet metal (about 20 g.), some paint, and a decal are all the supplies required.

Three shelves are cut as illustrated and brake bent as shown. The top shelf has slotted holes drilled and filed at predetermined points along the back ledge of the shelf. The other two shelves have slots notched just inside the bends to accommodate the vertical supporting bars.

Four bars of light weight wrought iron are

Metal wall shelf

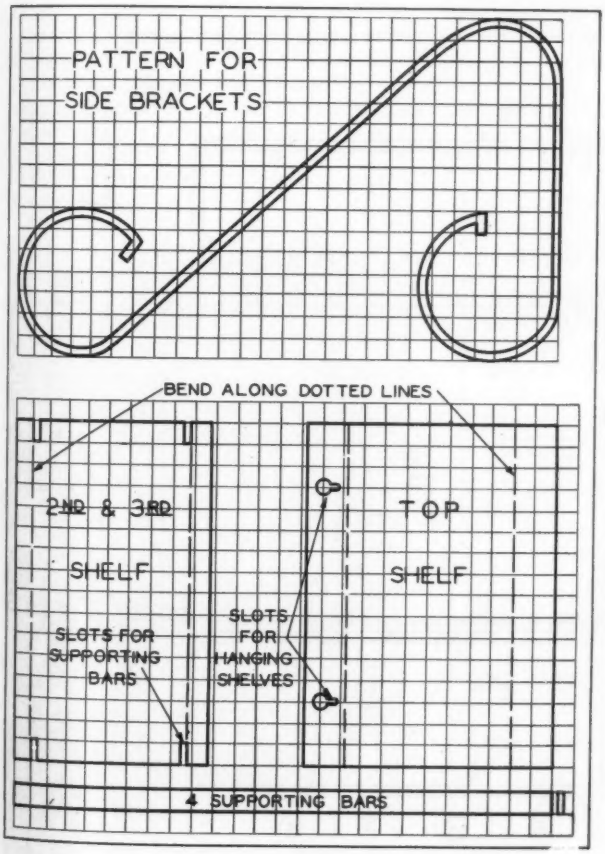
jig bent to match the pattern. These form the reinforcing brackets between the shelves along

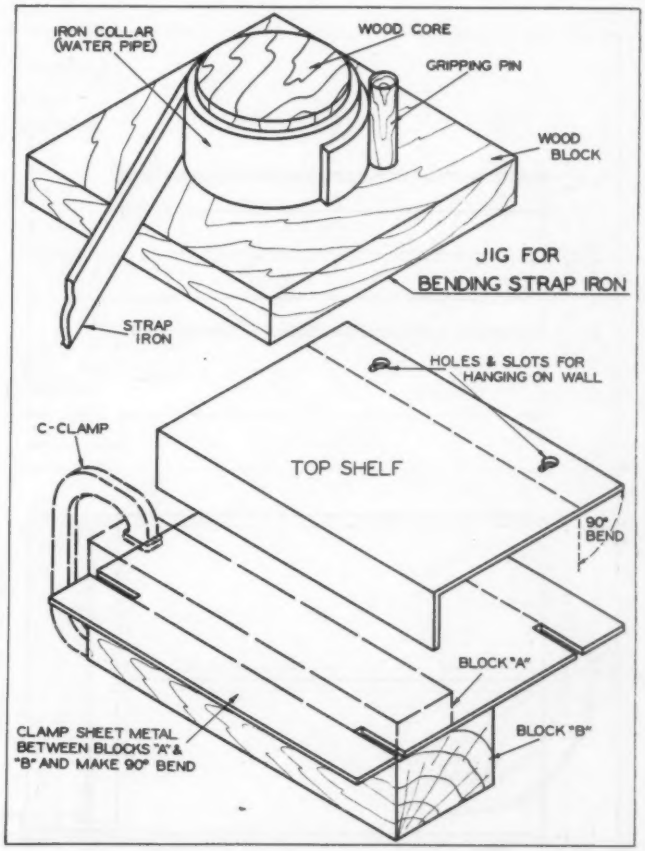


Metal wall shelf

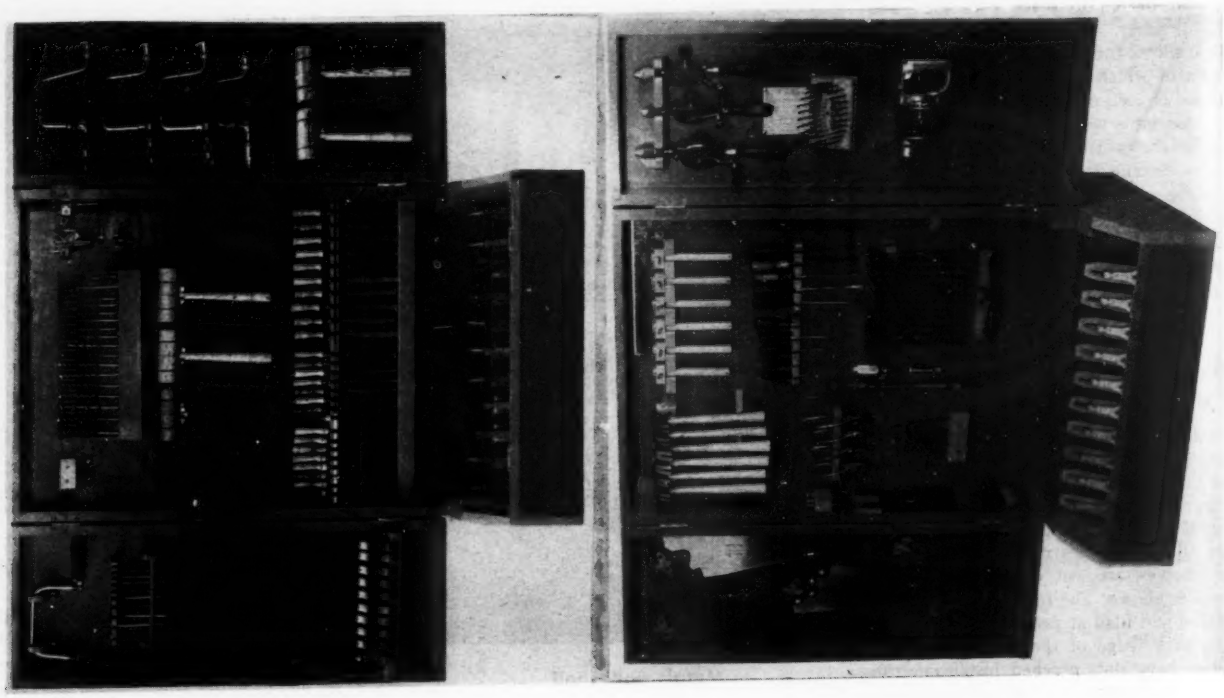
each side. Rivets, set at the key points, will hold the entire job firmly and well.

A coat of white or red lead paint makes excellent priming for any color that is to follow. The former is used for the lighter hues, the latter for the darker ones. The bright luster of the enamel finish, touched up with simple, scalloped repeat design in contrasting color, give the shelves their final finish.

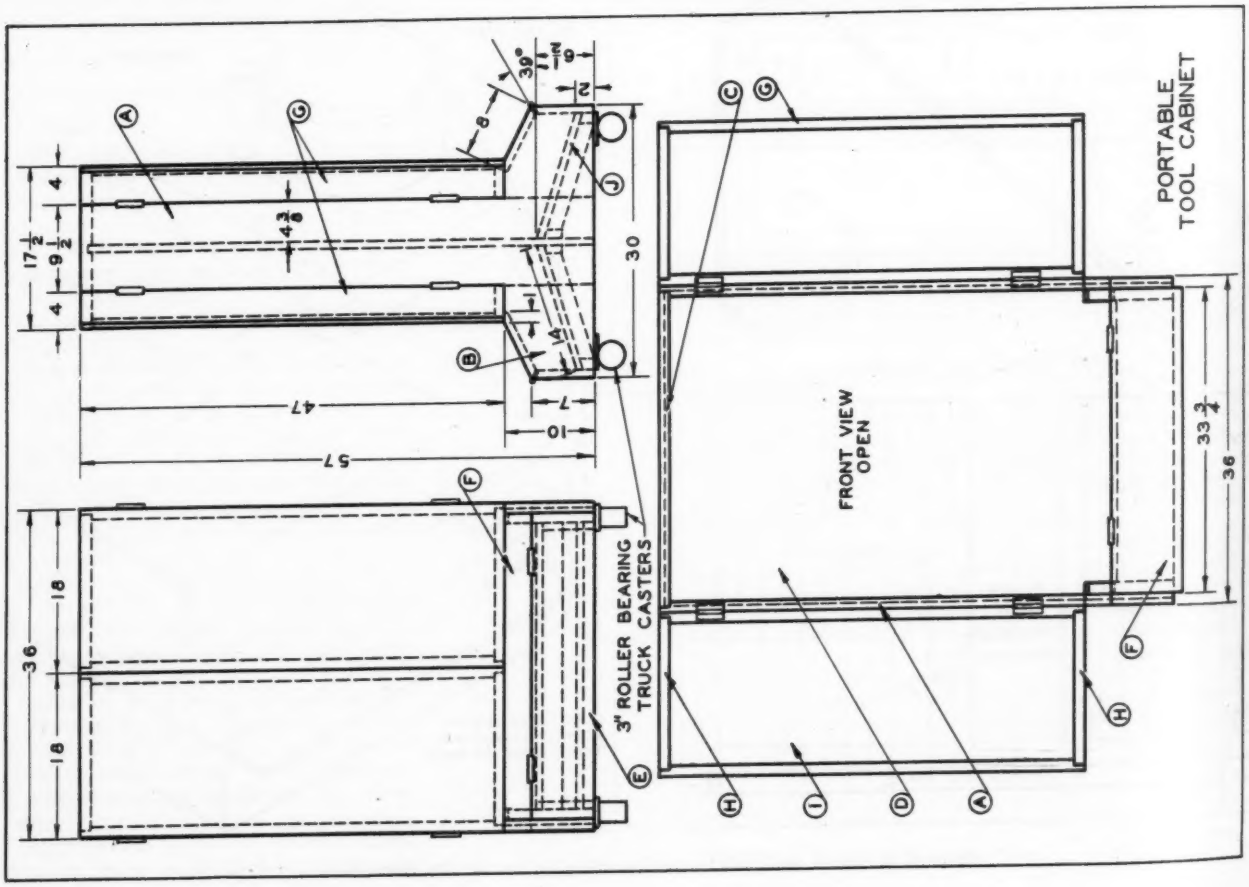




Details of metal wall shelf, and bending jig for scrolls, and shelves



Front and rear views of tool cabinet when open



Details of portable tool cabinet

PORTABLE TOOL CHEST

LOWELL L. CARVER
Associate Professor of Industrial Education
Iowa State College
Ames, Iowa

The tool-storage problem is one that has bothered many shop teachers. It is also a problem which is much discussed whenever shop teachers get together. There probably is no one solution to this problem, for what might be satisfactory in one situation would not work in another.

Plans for a portable tool cabinet are presented here with the thought that they may suggest possible solutions in a number of cases. It is not a cure-all for the tool storage problem in every instance, but it does have some definite advantages.

Advantages of the Portable Tool Cabinet

1. It can be used effectively where wall space is at a premium.
2. By using both sides a large number of tools can be kept in a limited space.
3. Being on castors and portable it can be moved out of the room or to various locations as different needs arise.
4. It fits well into the general shop type of teaching.
5. It fits into the small school's program where space for storage is limited. All the hand tools necessary for 15 to 20 boys can be placed in the cabinet.
6. The cabinet, when constructed and painted carefully, is an attractive piece of equipment.
7. Tool checking can be done quickly and effectively.

BILL OF MATERIAL

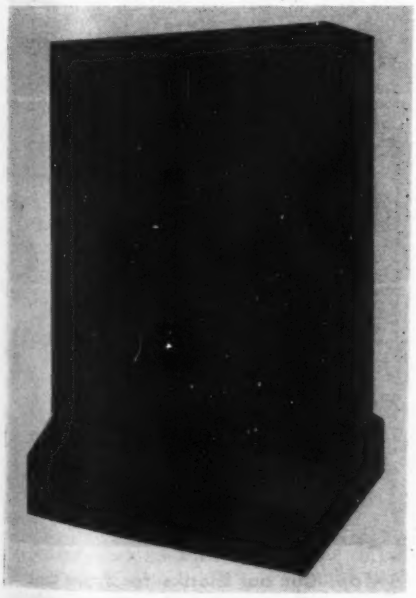
No. req.	*Part*	*Name of part*	*Material*	*Size*
2	A	Ends (uprights)	Pine	1⅛ x 9½ x 57
4	B	Ends (base)	Pine	1⅛ x 10 x 30
1	C	Top	Pine	1⅛ x 9½ x 34¾
1	D	Center panel	Plywood (5 ply)	¾ x 34¾ x 56½
2	E	Base (sides)	Pine	¾ x 7 x 33¾
2	F	Lid (hinged)	Pine	¾ x 8 x 33¾
4	G	Door sides	Pine	1⅛ x 4 x 47
4	H	Door top and bottom	Pine	1⅛ x 4 x 16¾
4	I	Door panels	Pine or Plywood	¾ x 18 x 47
2	J	Bottoms	Pine	¾ x 14 x 31½
6 pr.		Butt hinges		2 x 3
2 pr.		Castors		3
2 pr.		Hasps		4
2 pr.		Spring catches		

Procedure

1. Make uprights (part A).
2. Cut groove in uprights for center panel.
3. Make ends (base part B), it will be noted there are four of these parts required since they are made double to give strength and sound construction.
4. Assemble double ends and attach upright.
5. Make top (part C), cut joints for same.
6. Make base (side, part E).
7. Cut center panel to dimensions (part D).
8. Fit top and two bases to upright, locate and drill screw holes.
9. Make trial assembly.
10. Assemble top, uprights, and bases with center panel in place, drive screws.
11. Construct doors.
12. Hang doors.
13. Make and hang lids (part F).
14. Make two bottoms and fit into place.
15. Fit and attach hasps and spring catches.
16. Attach castors.
17. Prepare for finishing.
18. Paint satisfactory color.

The cabinet which is illustrated and described in this article is painted a vista green on the inside with all tool holders painted orange. The outside of the cabinet is painted a light gray. All tool holders are largely of original design, being made for the specific tool they will hold and the particular place they will occupy.

This tool cabinet is used in a general wood shop. The classes average approximately 20 students. The only tools checked out to the students are double-plane irons, try squares to a few, and occasionally a few planes. It is found that there are adequate tools in the cabinet to take care of 20 students.



View of portable tool cabinet when closed

SPIN-BALL BLOW TUBE

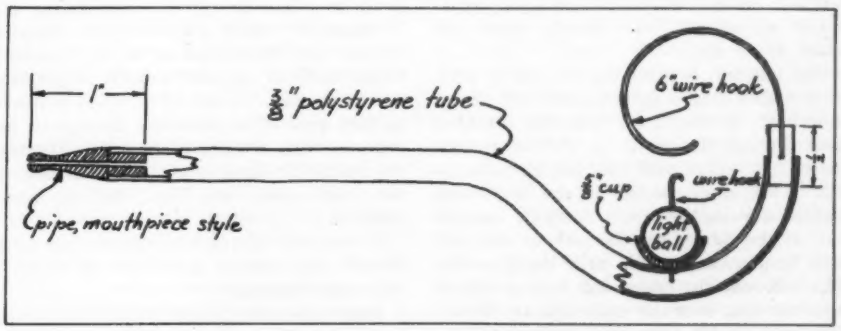
SIMON S. PALESTRANT
Bronx, N. Y.

This is an old trick used by physics instructors in their high school demonstrations.

A ⅜-in. Polystyrene tube is bent to the contour indicated in the diagram. A boiling water bath will soften the tube sufficiently to be bent to the correct curvature. A plug ½ in. long is cemented into the opening of the curved section and allowed to harden. Yellow dye is poured into the tube and after a three to five-minute period (depending upon the concentration of the dye); it is poured out again, and then allowed to dry.

The mouthpiece may be made out of a piece of amber or yellow acrylic or Polystyrene material. To save effort, a mouthpiece removed from a cheap tobacco pipe may be used instead. In the former case, shaping is done with grindstone and file, then sanded smooth and polished. In the latter, the prefabricated mouthpiece is simply fitted to the tube adapted to size and fit.

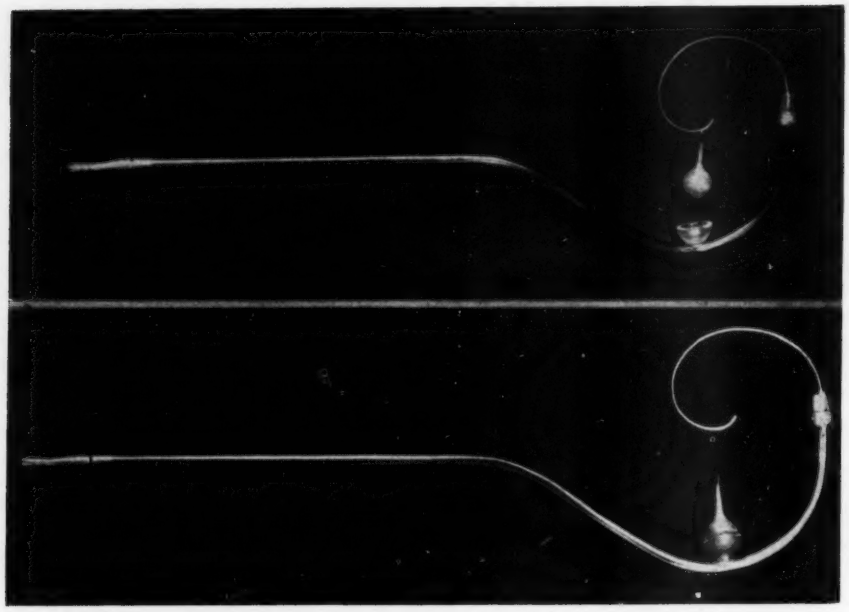
The mouthpiece may be inserted with a forced fit so that the stem of the blowgun may, at any time later, be cleaned. However,



Spin-ball blow gun

Front and rear views of tool cabinet when open

Details of portable tool cabinet



Spin-ball blow gun

it may be cemented into place as a permanent fit.

The 5/8-in. cup is shaped out of a piece of preheated 1/16-in. thick acrylic or styrene material. This is laid over the hollow dome of a dapping block and a dapping punch two sizes smaller is pressed into it and held until the material cools sufficiently to remain fixed. It is well to preheat the block and punch so that they will not chill the plastic material during the drawing operation. It permits a longer time span of work before cooling strains begin to set in.

The cup is cut away from the excess of material. It is then cemented to the inside curve of the bent section of the tube so that it rests at the lowest part of the curve. Any acrylic cement will form a sufficiently strong bond. Drill a small hole with a No. 58 drill (.046) through the center of the inside of the cup and through the adjacent wall of the tube. Caution: do not drill through the opposite wall of the tube.

The "hanger wire" is a piece of .046 round brass wire that is inserted by force fitting it into the plug at the end of the blowgun. It is bent into graceful and continuous spiral curves which end about 2 in. directly above the center of the cup.

The spin-ball is made out of pith or cork. It is shaped into a sphere about the size of an ordinary marble. A very thin wire is pushed clear through the center so that it projects about 1 in. above and just enough below so that it will allow the ball to rest in the cup without allowing the wire to touch the opposite wall of the tube. Coat the pith or cork ball with lacquer, nail polish, or a liquid plastic. This will seal the pores and form a smooth even covering over the entire sphere. Bend a right-angle hook, extending about 1/4 in. at the end of the long arm of the wire. Form a plastic bead at the end by repeatedly dipping the point only into nail polish. The spin-ball blowgun is now ready for use.

Place the ball so that the pin end extends into the hole of the cup. Blow gently, but continuously and firmly into the mouthpiece. This will cause swirls of air to be forced up out of the hole in the cup and around the bottom of the pith or cork ball. The ball will rise gently on this swirling cushion of air. As it rises, the participant should attempt to control it so that the wire hook above the ball will rise above the upper wire loop. As soon as this happens, stop the blowing and allow the ball to hook gently onto its perch.

USING STAMP HINGES IN THE DRAFTING ROOM

E. A. Rerucha
River Grove, Ill.

Stamp hinges, which are very thin transparent paper stickers, used by stamp collectors to mount stamps in albums, provide a very efficient means for holding drawing paper and tracing paper or cloth on a drafting board. Being very thin, they permit the sliding of the T square or ruling edge over the drawing without any obstruction as is the case with thumb tacks or upturned corners of masking tape when used. The hinges are easily removed as they peel off without any damage to the paper or cloth. Simply slide a dull knife under the tracing or drawing paper, and one end of the hinge peels off. The other is easily removed.

A standard 5/8 x 7/8-in. hinge is very satisfactory and may be purchased at 10 to 15 cents per thousand.

Hinges may also be used to patch and repair tracings, or to make corrections over worn areas. When blueprinted, very little evidence shows on the blueprint, at least not enough to be too conspicuous.

DOORSTOP WEDGE

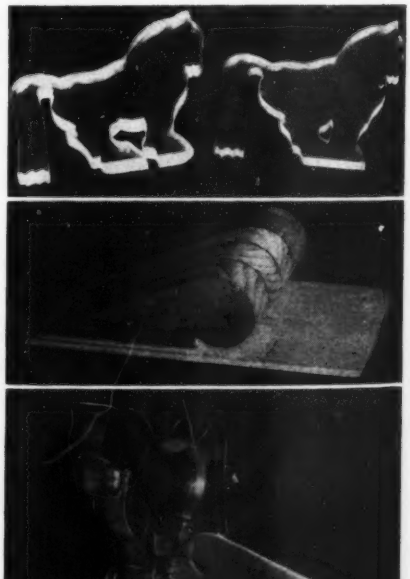
SIMON S. PALESTRANT
Bronx, N. Y.

Cunning little animal forms may be made to hold a particularly trying door in a fixed position. The doorstop, illustrated and described in this article, employs a plastic spring wedge to hold the door in the open position.

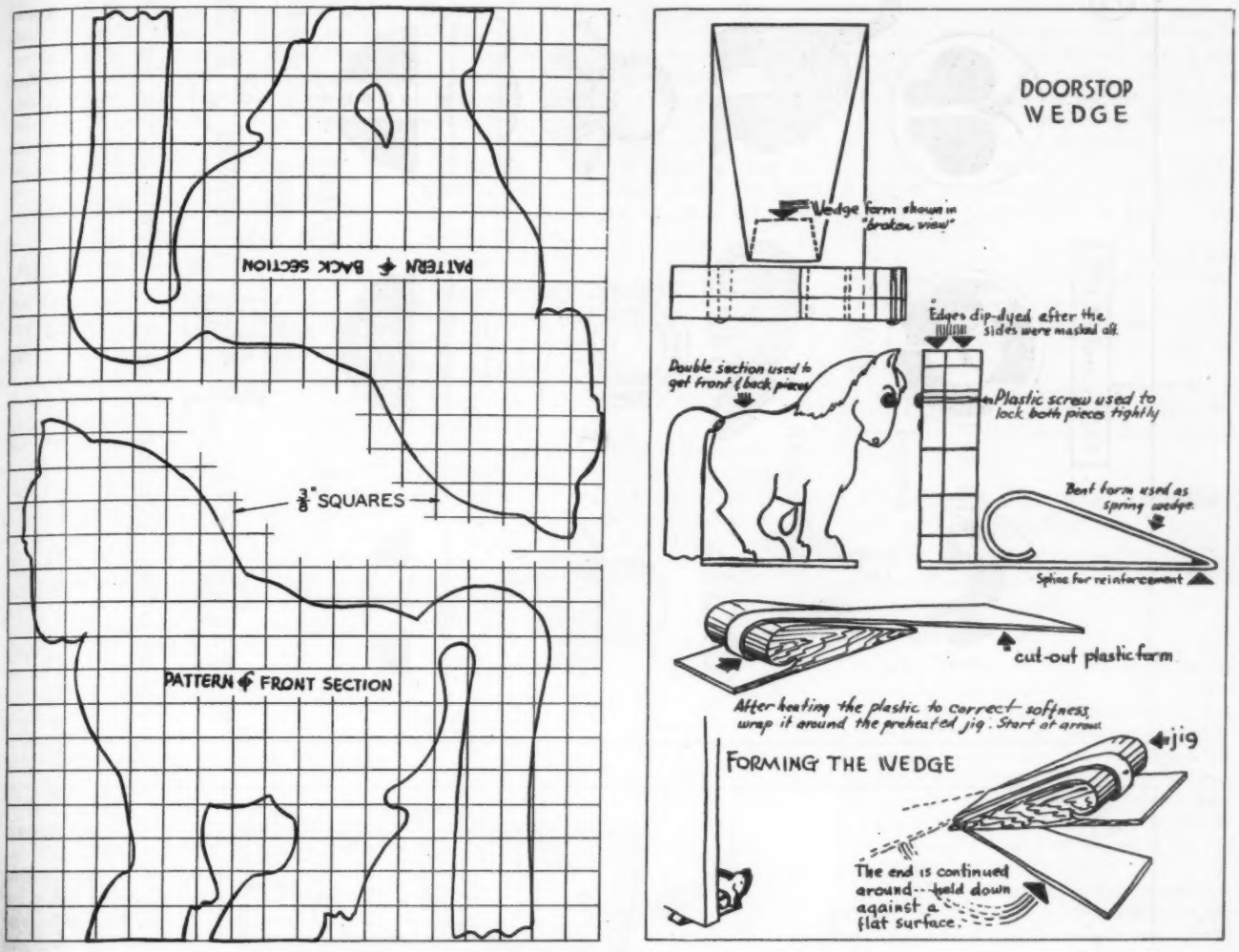
A horse was chosen for the doorstop described. The figure, about 5 3/4 in. high, was cut out of 1/2-in. clear plastic stock for the front. The back section was cut out of 3/4-in. stock. These parts were identical except in the position of the legs. On the inside face of the front section a line delineating the inside shape of the horse was routed with a ball-shaped cutter. These lines were then "wiped in" with an opaque plastic paint or painted in carefully with a highly concentrated dye.

The two pieces were then cemented together. Care must be taken so that the cement does not reach the "wiped-in" parts. Should this happen it will probably cause the paint to run, bleed, or creep. Whichever happens, it will be tragic to the results expected. Once the two parts are firmly attached, it is well to polish and buff the entire horse.

Paint both front and back surfaces with rubber cement clear up to the cutout edge. Then immerse this in a dye bath for about 15 minutes more or less depending upon the concentration of the dye. This process will dye the edges of the horse silhouette only. The



(Top) Cut out blanks for front and rear. (Center) Bending jig for the wedge. (Bottom) Front, back, and wedge assembled


PATTERN ⊕ BACK SECTION
⅜" SQUARES
PATTERN ⊕ FRONT SECTION
DOORSTOP WEDGE
Wedge form shown in "broken view"
Edges dip-dyed after the sides were masked off
Double section used to get front & back pieces
Plastic screw used to lock both pieces tightly
Bent form used as spring wedge
Splice for reinforcement
cut-out plastic form
After heating the plastic to correct softness, wrap it around the preheated jig. Start at arrow
jig
FORMING THE WEDGE
The end is continued around—held down against a flat surface.

Patterns and method of assembling doorstop wedge

rubber cement will act as a stop-out material. An alternate method of doing this is to cover the front and back surfaces with scotch tape, fill in the seams with rubber cement, and cut the scotch tape to match the silhouette of the horse exactly, then give it the dye bath. The same results will be obtained.

The wedge piece is a triangle, the base of which is 4 in. with an altitude of 16⅝ in. Then cut off 2 in. from its apex leaving a section 14⅝ in. long. This is rubbed with No. 7–0 emery cloth to obtain a frosted effect on all surfaces.

It is then heated and bent as indicated in the pattern layout. The wide end is cemented flush on front to the base of the horse. This is the doorstop wedge.

You will find that the door striking the inclined plane of the wedge will climb up on it while the wedge will spring downward. The curved backpiece will check it but will act as a secondary shock absorber by using the curved part as a second spring. Hence a sudden push of the door against the wedge, or the wedge against the door will not fracture the material, and the spring will hold the door securely.

AN IMPROVEMENT IN THE DRAFTING ROOM

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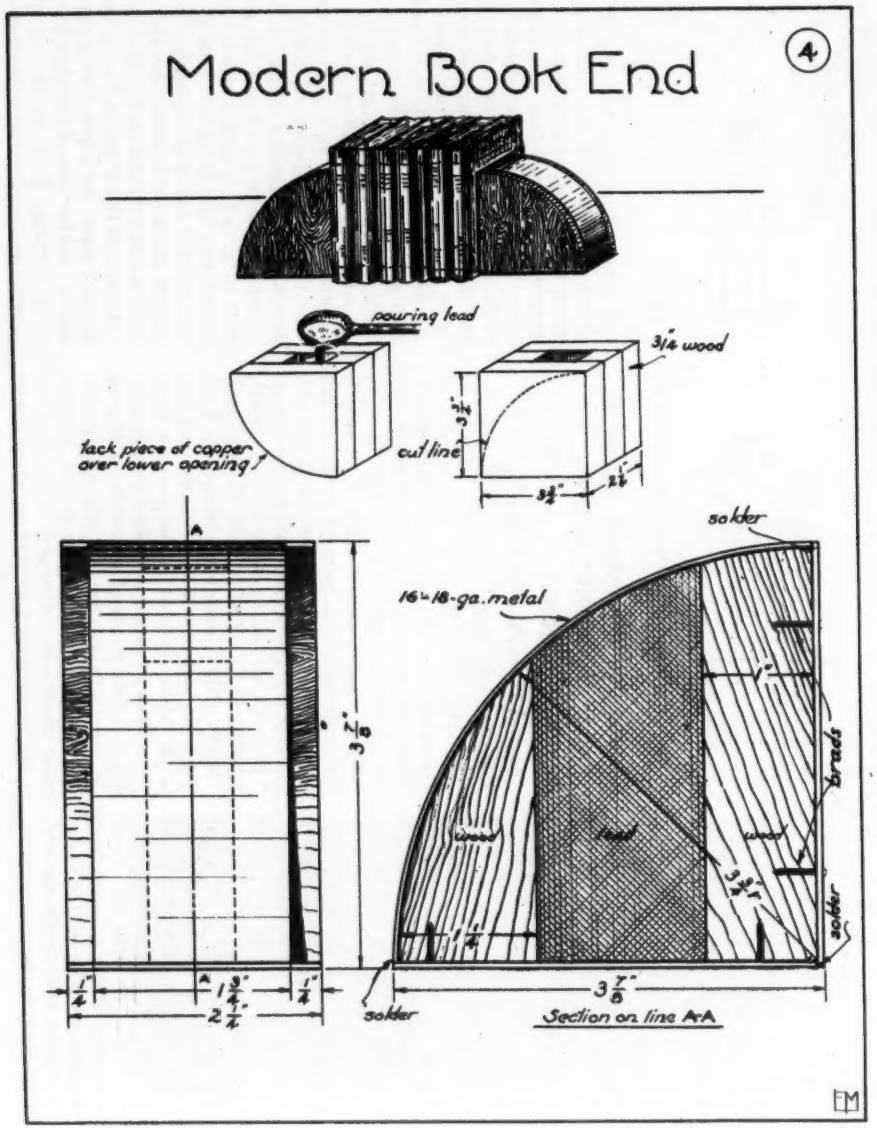
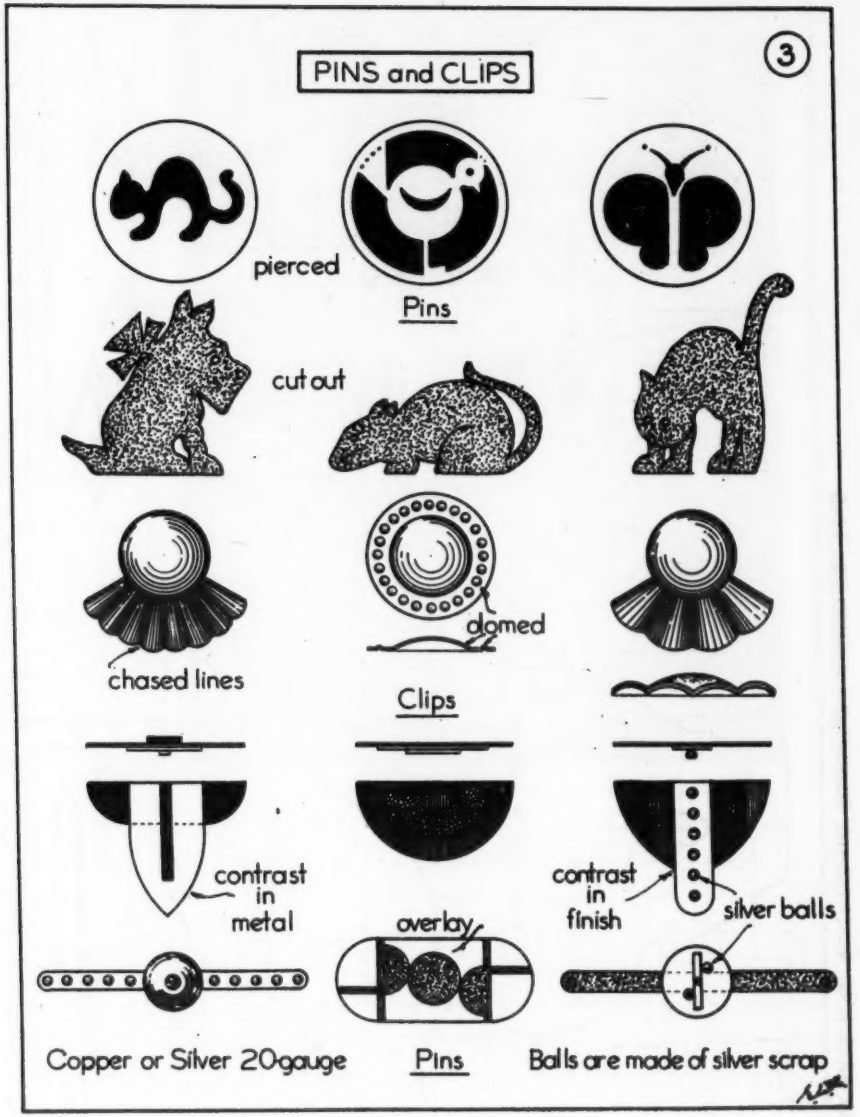
The attention of the class in Principles of Education was focused on a matter that has been taken for granted by all students in all subjects everywhere for a long time, namely, learning from a blackboard. "Larnin" wouldn't be natural unless it was *on the board* with chalk. It was pointed out that the contrast of white line on black background is exactly opposite to the students' work which is black lines on a white background. Mechanical drawing is a visual subject and is based on a language whose alphabet is composed of lines. A mechanical drawing is in black lines on white paper — the reading of a mechanical drawing is from a white line on blue paper. The former is the classroom usual, the latter is most unusual in a classroom.

For a long time I tortured my vocal chords with, "Read it, it's on the blackboard," etc., *ad infinitum*. Gradually the droplets of despair turned into a flood of realization that perhaps in some small simple way this reversal was really devastating. Here was one more opportunity to eliminate a factor which separated the teacher from the learner, one more opportunity to place them on a common basis so that their interchange of ideas might start from a common level — the students' level.

The blackboard T square which I use is the regular *parallel* used on drafting boards. In order to insure against its being pulled away from the attachment strings, I have the ends of the parallel caught in aluminum channels. The parallel moves up and down quite easily but it cannot strain the strings because it is held in runners. The use of this blackboard T square facilitates my own drawing and shows the students that the teacher's drawing grows up exactly like their own.

Along with this T square I use a large sheet of white paper and a heavy black pencil. The reaction to this type of blackboard work was really startling. This was due in no small measure to the fact that the diagrams are





Details of modern book end, and pins and clips designed by Emerson W. Manzer, Madison, Wis.

more easily seen at the opposite end of the room. Both lines and views took on new meaning. There was no transfer or gap between looking at the blackboard and looking at their own drawings. There was no working out of lines, no interpretation necessary. Now, both teacher and student are on a common level as far as the alphabet of lines is concerned.

MODERN BOOK ENDS AND METAL PINS AND CLIPS

EMERSON W. MANZER

Madison, Wis.

The scrap box in many woodshops has potential possibilities for many small projects. Small pieces of walnut, gum, mahogany, birch, or maple are all that are needed to make the modern book ends detailed in the accompanying illustration.

The stock should be ¾ in. thick. Four pieces 3¾ by 3¾ in., 2 pieces 1 by 3¾ in., 2 pieces 1¼ by 3¾ in., 2 pieces of copper or brass 16 or 18 g. and 1¾ in. wide to cover the face of the book ends, 2 pieces of metal 2¼ in. wide and 3⅞ in. long for the back, and 2 pieces with the same measurements for the bottom are required. These lengths may be slightly over or under depending upon the size of the wood part. After fitting the metal to the wood part the joints should be soldered as shown.

Glue the wood pieces together and then band-saw according to the dotted line. Leave enough material to sand and finish the wood to the line. Tack a piece of tin over the top opening, and pour melted lead into the opening. This added weight will make the book ends substantial enough to do the proposed job of holding books in place. File off surplus lead, then sand and finish the wood to fit the metal form made from the 3 pieces of metal. When the wood form fits into the metal frame, tack the wood to the frame with small brads. Cover the bottom with felt obtained from any old felt hat. Use water glass for adhesive.

As an alternate suggestion the metal may be placed over the front of the book ends only. Fasten with small tacks soldered to the back of the metal or use good-looking upholstery tacks, and fasten from the front.

After the assembly is made, go over the whole job with clear lacquer to keep the metal from oxidizing and also to enrich the wood used in the project.

BEGINNER'S CERAMIC PROJECT

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The ceramic project described in this article is simple enough for all and yet is a challenge to even the older and more experienced pupils.

The project is a paperweight approximately 3 by 3 in. square and ¾ in. thick. The basic shape may be a square, or it may be made of any other geometric shape. The sides can be beveled or shaped to any desired form. It may be given the shape of a flower, a butterfly, or a leaf. The possibilities are limitless. The form of the base is to be designed by the student, and copying should be discouraged.

Fig. 1. Paperweight. Projection on top piece to be fitted into hole in base

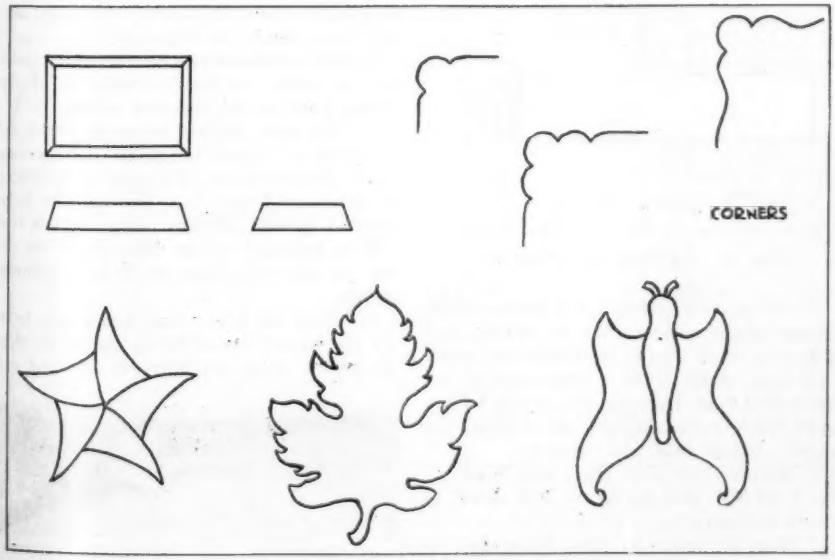

Fig. 2. Suggested basic shapes for paperweight

A form can be welded to the top of the base if a more advanced and attractive project is desired. The forms shown in Figure 2 are merely suggestive.

To insure a good weld, attach a small projection to the part to be attached to the base, and fit it into a hole made in the base. A drop of water and a twist welds the two together. For further assurance a little slip may be dabbed around the joint.

Then glue a piece of blotting paper or felt to the bottom and the paperweight is done for firing and the application of any other finishing that may be desired.

ALUMINUM KEY AND LICENSE HOLDER

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Industrial Arts Department

Sewanhaka High School

Floral Park, N. Y.

Industrial-arts instructors are always on the lookout for something new in machine-shop projects that hold interest for students. The project about to be described has proved to be popular with students in the author's industrial-arts machine-shop classes. Students like to make this project and are eager to take it home as a gift to their parents and friends. The user will find a neat container for his auto license and ignition keys.

The operations required for the construction of this project have been broken down to the simplest form and a ninth-grade boy should experience no difficulty with the successful completion of this job. As a shop teacher you will find that the materials required are both easy to obtain and are well within the means of your budget.

In order to make this project you will need a 9/16 N.S. tap and die to cut the threads required. An engine lathe with simple accessories and a drill press plus a few common hand tools will also be required.

Fig. 2. Turning to diameters given in Fig. 1

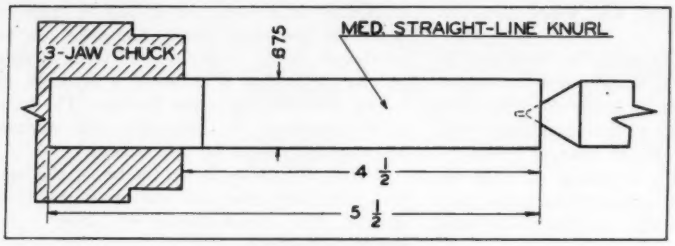

Fig. 1. Setting up the stock

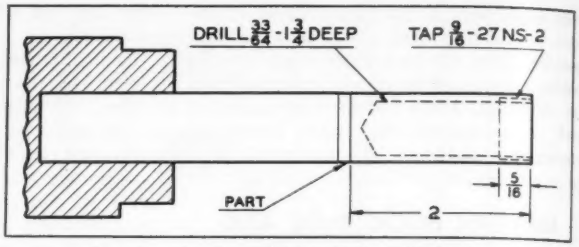

Fig. 6. Cutting off the finished piece

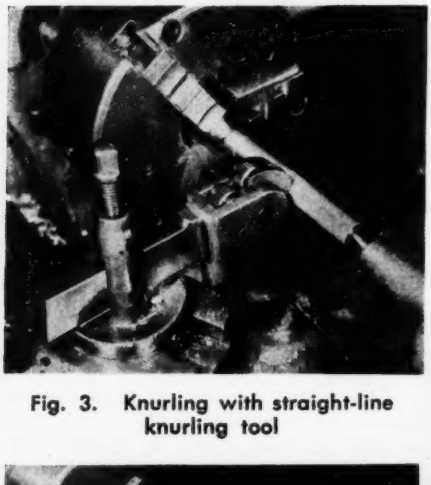

Fig. 3. Knurling with straight-line knurling tool

Fig. 4. Drilling tap-size hole

MATERIALS AND TOOLS REQUIRED

1 pc. ¾ round 17-ST aluminum 5½ in. long
1 key chain
Medium straight-line knurling tool, turning and cut-off tool, 9/16 N.S. plug tap, 9/16 N.S. die, 31/64, 33/64, and No. 19 drills. Rule, depth gauge, combined drill and countersink, *V* block and clamp drill chuck.

Procedure

1. Place aluminum stock in three-jaw chuck extending about 1 in. from jaws, face smooth and center drill.

2. Set up stock as shown in Figure 1, and rough and finish turn to required diameter.

Fig. 5. Cutting the internal thread while turning the chuck by hand

3. The project may be machined smooth and upon completion, may be buffed to a high luster. Or, the student may decorate the surface by using a straight-line knurling tool. This choice is left completely up to the student. If knurling is decided upon we must proceed next with this operation.

4. Adjust lathe for proper knurling speed and knurl as indicated in Figure 1. Kerosene oil is an excellent medium to use during this operation as it will keep the knurling tool free and clear of chips and aid in producing a clean-cut knurl. See also Figure 3.

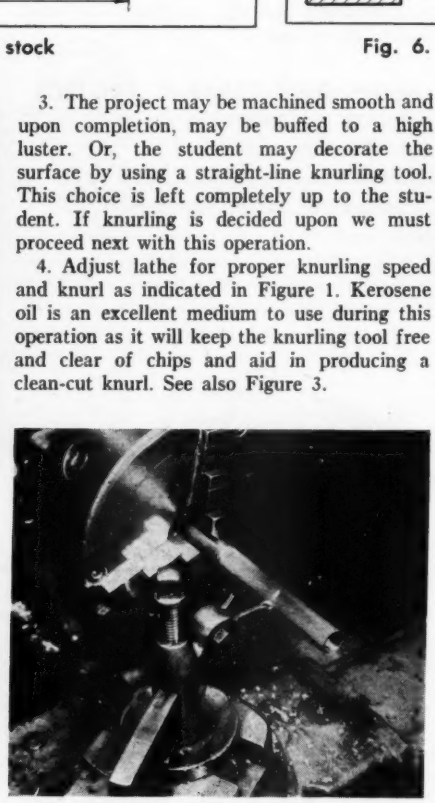

Fig. 7. Cutting off

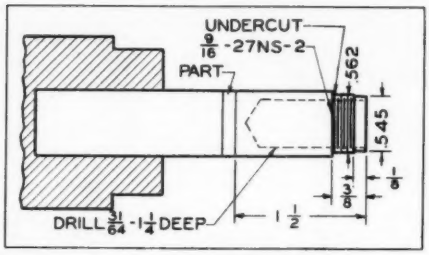

Fig. 8. Turning the shoulder

5. Set up the 33/64 drill in a Jacobs chuck, arrange proper spindle speed for drilling, and drill to a depth of 1¼ in. Check this depth with a rule depth gauge to insure accuracy of the drilled hole. Kerosene oil applied with a small brush to the drill will aid in producing a clean, smooth hole. See Figure 4.

6. Remove drill from chuck and substitute the 9/16 N.S. plug tap in the drill chuck, as shown in Figure 5.

7. Shut off power on lathe, bring tap into position, and cut threads to a depth of 5/16 of an inch turning lathe chuck over by hand and feed in with tailstock spindle. This method will insure proper alignment for the threads which is important to the construction of this project. Again cutting oil will aid in the thread-cutting job and should be applied to help chip removal and produce clean threads.

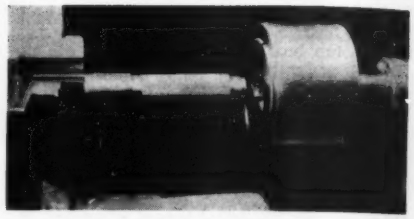

Fig. 9. Cutting the external thread

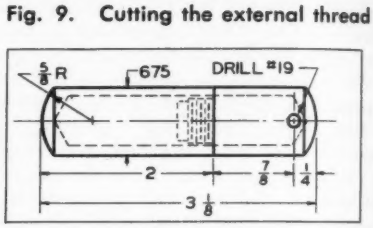

Fig. 10. Cutting the internal thread and drilling the small hole

8. Measure off 2 in. from the end, set up parting tool, and part off as indicated. See Figures 6 and 7.

9. Adjust lathe for turning speed, turn shoulder as shown in Figure 3 to a .562 dia. and ⅜-in. length. See Figure 8.

10. With undercutting tool in place under cut, as shown, to insure proper fit of the mating parts on the threaded section.

11. The next problem is to cut with a die a section of thread to match the previous piece. The author has constructed a die holder as shown in Figure 9 to fit into the lathe tailstock spindle. The dimensions for this tool will be governed by the diameter of the die and the size of the taper in the lathe tailstock spindle.

12. Place die into holder and set up lathe for the second thread-cutting operation. Shut off power, bring die into position and cut

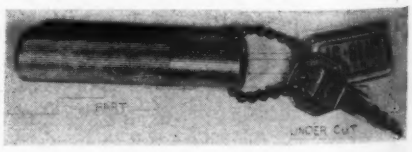

Fig. 11. The finished project

thread as indicated in drawing. Turn lathe over by hand, advance tailstock spindle at the same time until desired length of thread is cut. Remove die by reversing headstock spindle by hand and by backing off with tailstock spindle.

13. Set up lathe for drilling and drill a 31/64 hole with twist drill to a depth of 1¼ in.

14. With the aid of a parting tool, cut off as indicated, and screw the two pieces together.

15. Place job in three-jaw chuck, and make certain that too much pressure is not applied with the chuck wrench as this will mar the knurl. A protective piece of metal may be used to prevent this from occurring but make certain that the piece turns concentric.

16. Cut a 5/8 radius on both ends and polish finished ends with 200 grit aloxite cloth and cutting oil. A form tool may be ground to this radius and used for this operation and will accelerate the making of this project.

17. Transfer project to a "V" block, locate and lay out hole for key chain. Set up drill press for correct drilling speed and drill a No. 19 hole as indicated in Figure 10.

18. The ends may be buffed to a high luster to contrast to the satin finish of the straight-line knurl.

19. Insert key chain through the hole drilled for this purpose and the project is completed. See Figure 11.

METAL LETTER RACK

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Procedure

1. True up two pieces of 26-g. galvanized iron 3½ by 8 in., and 1½ by 6½ in.
2. Round corners on larger piece.
3. Lay out and drill holes in each piece.
4. Draw file and clean edges with steel wool.
5. Rivet base to bottom with ⅛ by ¼-in. oval head aluminum rivets.
6. Bend the sides as indicated.
7. Roll feet over a ½-in. dowel.
8. Wipe with vinegar, and paint, using any desired color. Aluminum or gold powder may be blown on while the paint is still wet.

REFINING SILVER

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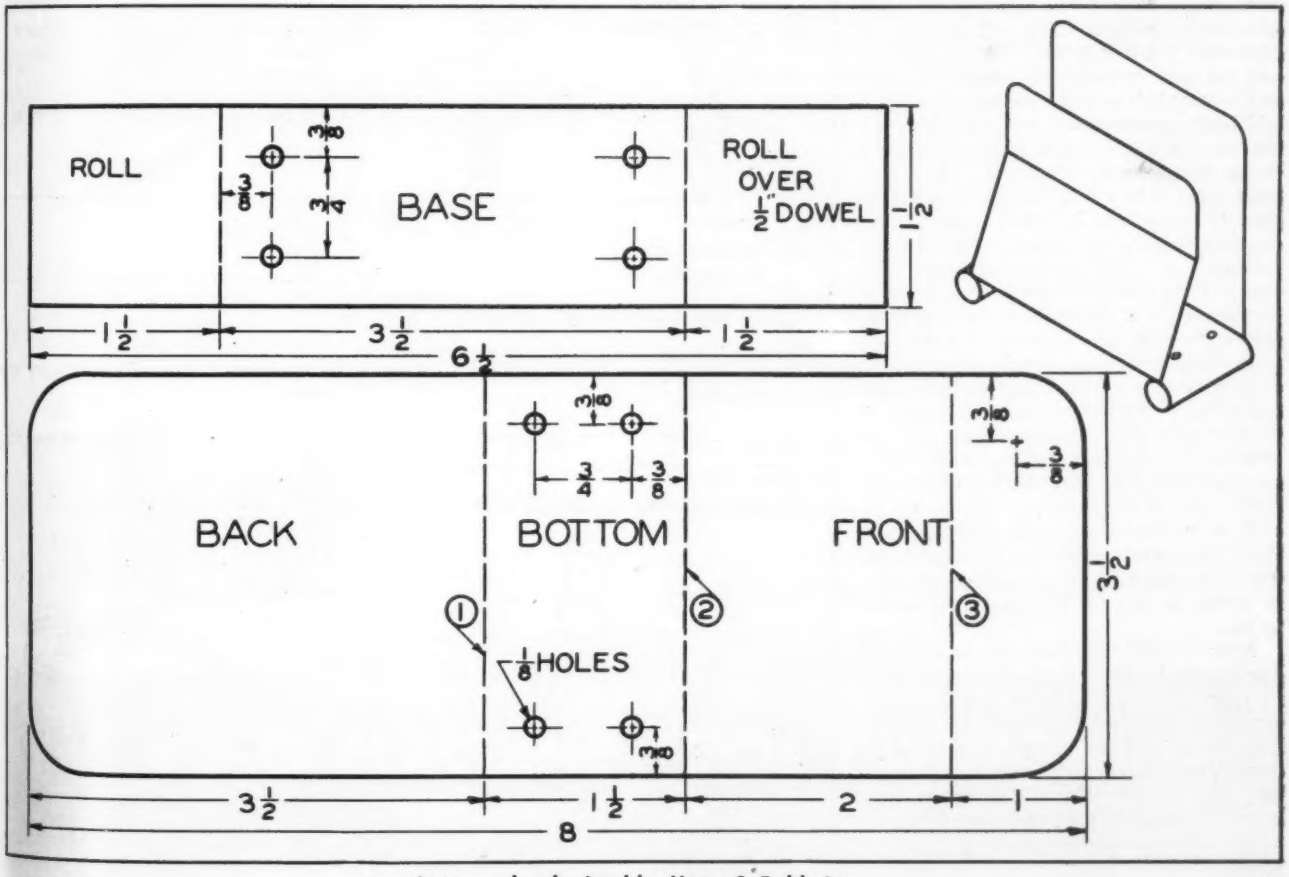
It has often been said that the curse of modern workshops is the dependence of the workman on machine-made things. The modern workman of fine metals does not melt an ingot and roll a small piece of metal and draw his wire to the exact size for himself. Instead, he purchases commercial sheet silver and silver wire of various gauges.

If one has the ambition and persistence plus the following equipment he can make his own silver sheets, wire, tubing, etc.: (1) unrefined silver, filings, old jewelry, old coins, etc.; (2) nitric acid; (3) glass, earthen, porcelain, or similar container; (4) large earthen jar; (5) copper strips; (6) filter cloth; (7) crucible; (8) blowtorch and foot bellows, crucible furnace, or gas and compressed air torch; (9) borax; (10) rolling mill; (11) tinner's shears; (12) draw bench; (13) draw plates; (14) draw tongs.

If one does not have access to a science laboratory which has an exhaust hood, it is best to do some of this work in a vacant lot in the open air.

Place some of the unrefined silver, cut in small pieces, in a container and slowly pour in some of the concentrated nitric acid. Care must be taken to work slowly or the action will be too fast and the acid will boil over, and some of the silver will be lost. Slowly add enough acid to cover the metal. Brownish-yellow fumes will boil from the container. Be careful not to inhale these fumes. After the fumes have ceased apply a little heat to the container. If working out in the open air an alcohol torch, a gasoline blowtorch or canned-heat stove (sterno) will supply enough heat. If working under a chemistry hood use



Letter rack submitted by Harry S. Baldwin

a bunsen burner. Watch the action closely, and do not permit the liquid to boil over. The heat does nothing chemically except it makes the acid work more rapidly. Keep adding a little metal every few minutes until the desired amount is in the container. Also keep adding acid, a little at a time, every few minutes. After about two hours time the brownish-yellow fumes will cease. Add more acid, and, if the fumes are white or light in color, this process is finished. The colored fumes were the copper and other such metals being burned out. If the metal contained any gold, it will have settled to the bottom in small lumps and may be picked out. The silver is in suspension.

Pour about two gallons of water in a large earthen jar, then pour in the silver solution. Add enough water to fill the jar. Clean several strips of copper and hang them in the diluted solution, and leave undisturbed for several hours. The silver in solution will be deposited on the copper strips by replacement of metal. It will appear as a gray, creamy, slimy deposit. Wipe off the deposit, and pour the solution through a fine filter cloth. Rinse out jar, and filter the rinse water. The collected silver may be set away for a few hours to permit the water to evaporate. The silver is not shiny as we know silver metal but resembles cement, both in color and texture.

After the water has evaporated the melting-down process follows. Place some of the silver in a small fire-clay crucible, and heat with a blow-torch and foot bellows or compressed air and gas torch or a crucible furnace. As soon as the crucible is red hot, the cementlike silver will begin to melt down. Add more silver to the crucible, and continue adding until all is in the crucible or enough is melted to form a small ingot. Add a small amount of borax or flux. When the metal is properly melted, which requires only a few minutes, the silver is poured into a mold forming an ingot. One should warm and grease the mold beforehand to prevent the silver from splitting and sticking to the sides. This ingot is 1000 per cent pure silver.

Pure silver is quite soft and is whiter than the silver we usually see, which is known as sterling silver. If one wishes to make his own sterling silver he may add seventy-five (75) parts of copper to nine hundred twenty-five (925) parts of fine silver.

If one wishes strip or sheet silver he should pour the molten metal into a broad mold, but, if he wishes to draw the silver into wire, it is best to cast the bars in a long narrow mold.

After the silver has been cast into a small bar it must be rolled to the desired thickness or gauge. This is done by passing it through a pair of steel rolls which work on the same principle as a clothes wringer. Each time the metal passes through the rolls it is flattened out and becomes thinner and longer. It is necessary to anneal the metal quite frequently so as to counteract the hardening caused by pressure of the rollers. After the sheet is rolled out quite thin, narrow strips may be cut off with tinner's shears. These strips may be made into very fine wire of any desired shape as round, square, rectangular, hexagonal, half round, etc., by being pulled through a drawplate having a series of graduated holes of the desired shape. One needs a drawbench and a pair of drawtongs to pull the heavier wire through the drawplates. It is necessary to anneal frequently as each drawing hardens and compresses the metal. Wind in a coil or bundle when annealing. After the wire has become quite small it may be drawn by hand through a drawplate held in a bench vise. The wire slips through the plate much easier and smoother if it is rubbed with beeswax each time before being pulled through.

Since it may have been necessary to refine one's own silver, one likely may have to make

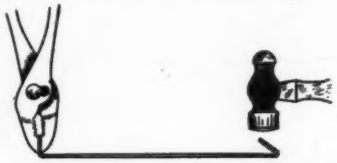
(Continued on page 20A)

COOKY CUTTER

(1) DRAW OUTLINE OF FIGURE TO BE USED ON PAPER.

(2) CUT A PIECE OF TIN $\frac{1}{4}$" LARGER THAN OUTLINE.

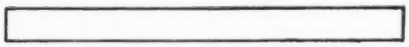
(3) CUT OFF CORNERS AS INDICATED



(4) FOLD ON DOTTED LINES WITH PLIERS OR BAR FOLDER.

(5) TAP EDGES LIGHTLY WITH HAMMER.

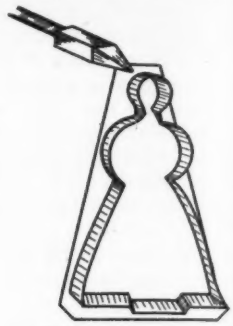
(6) LAY STRING ON OUTLINE OF FIGURE AND COMPUTE THE LENGTH OF METAL REQUIRED.



(7) CUT REQUIRED LENGTH, $\frac{3}{4}$" WIDE.

(8) SHAPE HEAD AND OTHER ROUND PARTS OVER A BROOM STICK OR STAKE.

(9) FORM SHARP ANGLES WITH PLIERS.



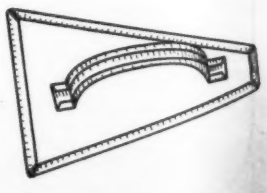
(10) PLACE BODY IN POSITION ON BACK WITH FOLDS DOWN AND TACK WITH SOLDER.

(11) SOLDER ALL PARTS FIRMLY IN PLACE.

(12) CUT HANDLE OUT AND SNIP OFF CORNERS.

(13) FOLD EDGES WITH PLIERS OR BAR FOLDER.

(14) TAP LIGHTLY WITH MALLET.



(15) FORM HANDLE AND SOLDER IN PLACE.

Project sheet — cooky cutter submitted by Clifford L. Yard and Henry J. Kauffman, industrial-arts department, State Teachers College, Millersville, Pa.

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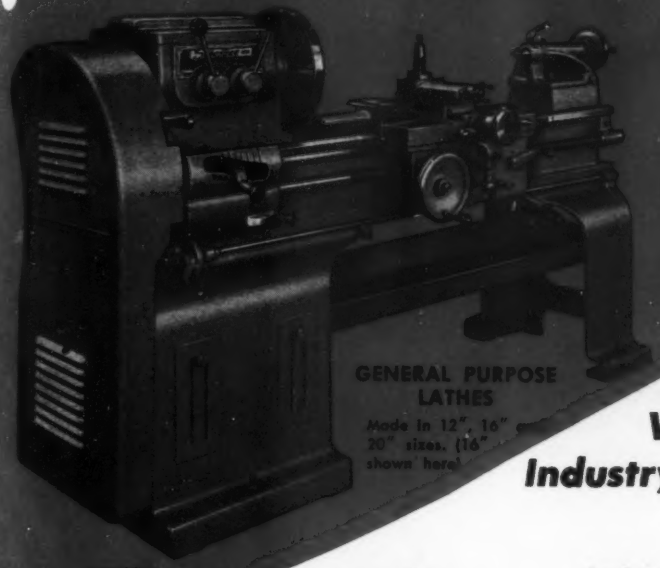

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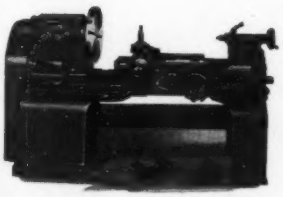

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American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

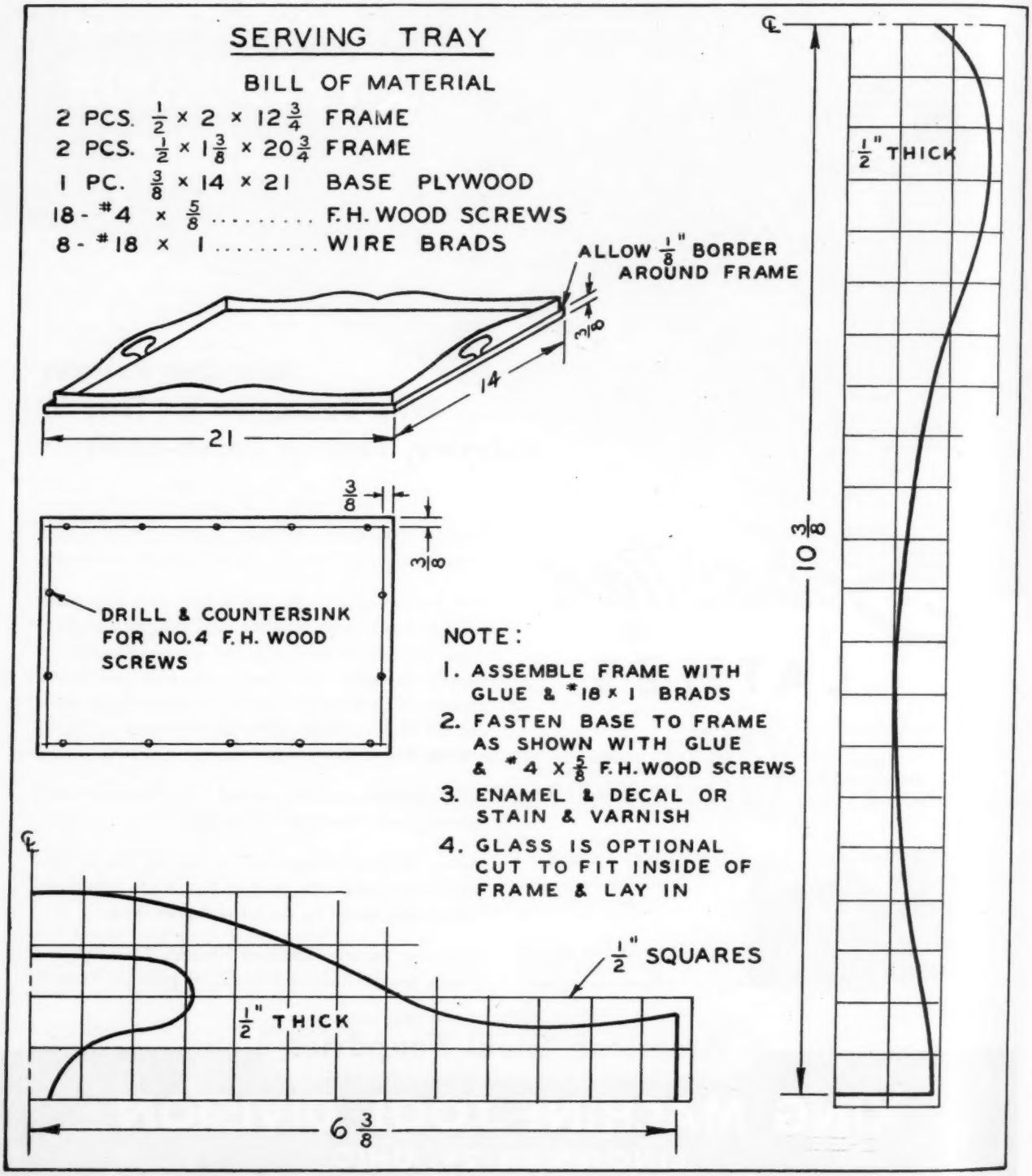
Builders of Vertical Boring & Turning Machines and Sebastian Lathes

LETTER RACK

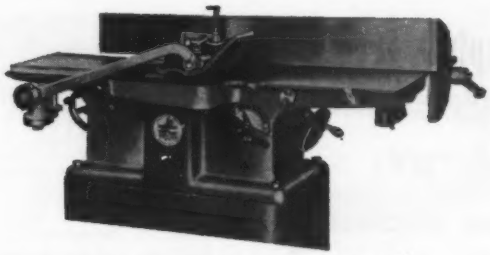
(Continued from page 342)

his own solder. Easy flowing solder can be made by melting 16 parts of pure silver in a crucible, adding a little borax as flux. Add 4 parts of pure copper, 3 parts of zinc, and 1 part of tin. Shake the crucible or stir the molten ingredients to mix the alloy. Then pour the metal into a warm, greased, flat mold.

Hard flowing solder may be produced by adding 10 dwts. brass to 1 oz. of pure molten silver.


SERVING TRAY
BILL OF MATERIAL
2 PCS. 1/2 x 2 x 12 3/4 FRAME
2 PCS. 1/2 x 1 3/8 x 20 3/4 FRAME
1 PC. 3/8 x 14 x 21 BASE PLYWOOD
18 - #4 x 5/8 ..... F.H. WOOD SCREWS
8 - #18 x 1 ..... WIRE BRADS
ALLOW 1/8" BORDER AROUND FRAME
3/8
14
21
3/8
3/8
DRILL & COUNTERSINK FOR NO. 4 F.H. WOOD SCREWS
NOTE:
1. ASSEMBLE FRAME WITH GLUE & #18 x 1 BRADS
2. FASTEN BASE TO FRAME AS SHOWN WITH GLUE & #4 X 5/8 F.H. WOOD SCREWS
3. ENAMEL & DECAL OR STAIN & VARNISH
4. GLASS IS OPTIONAL CUT TO FIT INSIDE OF FRAME & LAY IN
1/2" THICK
3/8
10
1/2" SQUARES
1/2" THICK
6 3/8

Serving tray submitted by A. H. Souerwine, Edgar Fahs Smith Junior High School, York, Pa.



6" Jointer, Model P-910. Rabbets to ½", planes ribbon thin. Accurate depth gage and miter gage. Fence 29½" long, 4½" high—stops provided at 45° and 90° positions. Speed: 4200 r.p.m. Full protection safety guards. Price: less motor, switch and machine base, $102.00

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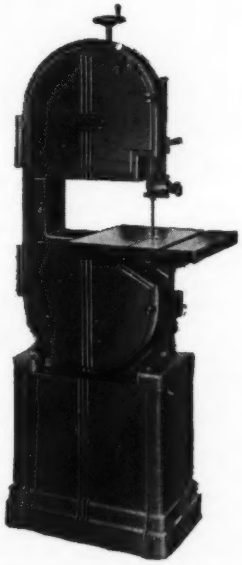

14" Band Saw, Model BN-905. Cuts full range of materials. Blade speeds with standard motor—175 to 4630 s.f.m. Slo-speed motor speeds, 61 to 1950 s.f.m. with reduction gear assembly. Table tilts to 45°. Full safety features. Price: less base, motor, gear assembly, and belt guard, $129.50

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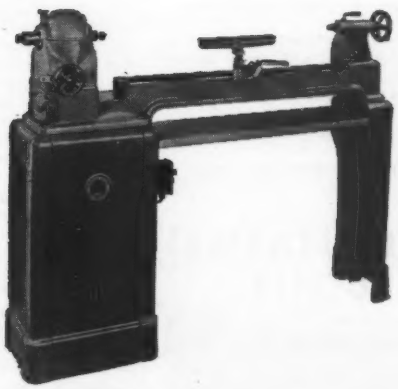
JIG SAWS • TABLE SAWS • JOINTERS
DRILL PRESSES • TILTING ARBOR SAWS
LATHES • BELT & DISC SURFACES



Variable Speed Lathe, Model L-1152. Swing over bed, 12"; over gap, 15". 38" between centers. Outboard mounting provided for face plate. Speeds: 2" pulley, 240 to 2000 r.p.m. With 4" pulley, 460 to 3750 r.p.m. Price: less motor, $153.00

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Personal News

APPOINTMENT TO INDUSTRIAL ARTS FACULTY, WESTERN MICHIGAN COLLEGE

Lindsay G. Farnan of Rochester, N. Y., has been appointed to the position of assistant professor of industrial-arts education at Western Michigan College, Kalamazoo. His appointment, effective September 1, 1948, fills the vacancy created by the retirement of Marion J. Sherwood, one-time head of the department.

Farnan has his bachelor of science degree from the Buffalo State Teachers College, and his master of arts degree from the Iowa State College. He has been an instructor the past year in the industrial-education department of Iowa State College.

GEORGE C. DONSON RETIRES

George C. Donson, for the past 31 years supervisor of the industrial-arts program at Washington High School, Washington, Pa., retired this past June after completing 41 years in the teaching profession. Beginning in a one-room rural school, he advanced to principal of grade school, then supervising principal, and in 1913 started teaching woodworking and mechanical drawing at Marietta, Ohio, and came to Washington High School in 1917. Donson is a graduate of Washington and Jefferson College and received his master's degree from the University of Pittsburgh in 1928.

For many years he supported the general shop idea of shop organization. He was active in the industrial-arts association, and served as chairman of the industrial-arts section of the Western Arts Association. He has been a member of Phi Delta Kappa for 20 years.

Donson expects to travel somewhat, visit museums, and devote more time to his hobby of clock repairing.

A PIONEER DIES

Samuel Owen Champion of Lakewood, Ohio, whose teaching career spanned nearly half a century, passed away on July 18 after a short illness. He was 72 years of age, having been born October 2, 1875, at Derby, Ind.

While still in his teens he began teaching near his birthplace. After a few years he entered Valparaiso University and graduated from the manual training course in 1905. He then started the manual training work at Lakewood, Ohio, and soon was running classes in woodwork, metalwork, and drawing. Under his direction the work flourished and soon was among the best in the state.

He attended summer sessions at Columbia University, Bradley Polytechnic Institute, Massachusetts Institute of Technology, and did graduate work at Western Reserve University.

When Lakewood's present high school building was opened in 1918, he started the work in printing in which he continued until he retired in 1943. A fine mechanic, a master teacher, he was best known in the teaching profession for the high grade of printing turned out by his classes. Many printers of northeastern Ohio who received training under him remember that his constant aim was that the finished product must be as near perfect as possible. — *J. H. McCloskey*

♦ Dr. William E. Warner, professor of education at the Ohio State University, Columbus, and currently president of the Ohio Reserve Officers Association, is again on the research staff of the Command and General Staff College at Fort Leavenworth, Kans., during September, where he is concluding an analysis of the regular course in addition to the extension course program.

♦ M. Ray Karnes, formerly assistant professor of industrial education, University of Missouri, Columbia, Mo., has joined the department of industrial education at the College of Education, University of Illinois, Urbana, Ill.

♦ W. Carlisle Anderson has again been appointed industrial-arts supervisor in the University High School at the University of Minnesota, Minneapolis, Minn. He will assume his duties at the college on September 16, 1948.

He left this position in March, 1943, to enter the navy. Upon his discharge from the navy in January, 1946, he taught engineering drawing and descriptive geometry at the University of Oklahoma.

He will also finish the work on his doctor's degree at Minnesota.

♦ J. W. Hungate, North Platte River Valley teacher and vocational guidance supervisor, has been named director of the new university center at Torrington, Wyo.

Mr. Hungate was former chief of the vocational rehabilitation and educational division of the veterans administration in Cheyenne. Earlier he served as teacher at Seward and principal of Scottsbluff, Neb., and Lusk, Wyo., high schools.

♦ Jean A. Anderson, instructor in engineering drawing at the University of Wisconsin's extension service in Milwaukee, has been appointed assistant professor of technical drawing at Illinois Institute of Technology, Chicago, Ill.

Mr. Anderson received his B.S., and M.S. degrees from the Stout Institute of Menomonie, Wis. He has been employed as tool designer by Allis-Chalmers Co. in Milwaukee and as civilian instructor and noncommissioned electronics technician by the navy.

♦ Henry Kauffman, instructor in metalwork at the State Teachers College, Millersville, Pa., was one of 12 persons selected to study for a month's course in silversmithing, taught by the Baron Eric Fleming, court silversmith to the King of Sweden. The course was conducted at the Rhode Island School of Design.

♦ Ralph W. Tyler, an authority on the relationship between testing and education, was appointed dean of the division of social sciences at the University of Chicago. He will continue as chief examiner of the University of Chicago. Philip M. Hauser, former assistant director of the Bureau of the Census, and Sol Tax, noted anthropologist, were named associate deans under Mr. Tyler.

♦ Floyd W. Reeves, professor of education, was appointed acting chairman of the department of education at the University of Chicago.

♦ Elton W. Jones, assistant professor of electrical engineering at Pennsylvania State College, has been named associate professor at Illinois Institute of Technology, effective September 1.

Mr. Jones obtained his bachelor's and master's degrees from the University of Maine in 1928 and 1929. At Cornell University, he was instructor from 1929 to 1941, and assistant to the dean of engineering in 1941–42. He lectured at Harvard University from 1943 to 1945.

♦ L. Robert Beardsley, 326 Fourth St., Downers Grove, has been appointed instructor in electrical engineering at Illinois Institute of Technology, Chicago, Ill.

A graduate of Downers Grove Community High School in 1937, Mr. Beardsley has received bachelor's degrees in both mechanical engineering and electrical engineering at Illinois Tech.

♦ Harold L. Minkler has been named assistant director of placement at Illinois Institute of Technology, Chicago, Ill.

Mr. Minkler joined the Illinois Tech staff in 1941; he is now an associate professor of technical drawing. He served in the navy as a commissioned officer during the war in Hawaii, Australia, New Guinea, and the Philippines.

He obtained his bachelor's degree at Purdue University in 1940, and his master's degree at Texas A. & M. College in 1941. At both institutions he was an instructor in drawing.

♦ Charles W. Selheimer, head of personnel selection and training in the development department of the United States Rubber Co., has been named professor of chemical engineering at Illinois Institute of Technology, Chicago, Ill.

(Continued on page 24A)

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(Continued from page 22A)

♦ ARTHUR J. ELGES, supervisor of trade and industrial education, Michigan State Board of Control for Vocational Education, has assumed the duties of co-ordinating chairman of research committees of the Michigan Industrial Education Society. He succeeds Dr. Harold Silvius of Wayne University.

♦ HERBERT NELSON, former teacher in rural schools of Kalkaska County, Mich., has accepted a position in Bad Axe, Mich. Nelson will teach general shop and farm mechanics, also courses in the Veterans Institute.

♦ DONALD F. HACKETT, formerly associate professor of industrial arts at Murray State College, Murray, Ky., was appointed head of the division of fine and practical arts at Georgia Teachers College, Collegeboro, Ga.

♦ WILLIAM SARGENT, assistant professor of industrial arts, Northern Michigan College of Education, Marquette, has developed a series of slide films showing industrial arts in action. The series is called "How to Achieve Goals in Industrial Arts." These slide films are excellent for showing before civic groups or parent-teacher meetings.

♦ RALPH O. GALLINGTON, formerly associate professor of industrial-arts education at Eastern Illinois State College, Charleston, Ill., has been appointed professor of industrial-arts education at Pennsylvania State College, State College, Pa.

♦ FRANK R. KEPLER was honored by the University of Michigan when he was presented with the Cleo Murtland Award at the thirteenth annual convocation of the School of Education. Presentation of the award was made by Thomas Diamond, chairman of the department of vocational education, University of Michigan. The award was given to him in recognition of his outstanding achievement in the field of vocational education and the maintenance of high professional ideals.

♦ HARRY GUNDERSON, formerly at the Laboratories School, Indiana University, Bloomington, Ind., has been appointed assistant professor of industrial arts, Eastern Illinois State College, Charleston, Ill.

♦ ROBERT LLOYD CANTOR, professor of fine and industrial arts at West Virginia Institute of Technology, had a visiting professorship at Columbia University this summer for industrial-arts teachers from all over the country.

♦ John J. Ahern, director of the department of fire protection and safety engineering at Illinois Institute of Technology, has been named chairman of a special educational committee of the National Fire Protection Association.

The seven-man committee will study the professional status of fire protection engineering. Its recommendations will deal with the possible formation of a national society of fire protection engineers.

Members of the committee are: Warren J. Baker, chief engineer, Insurance Company of North America, Philadelphia; A. L. Cobb, Eastman Kodak Co., Rochester, N. Y.; John A. Neale, vice-president and chief engineer, Underwriters' Laboratories, Chicago; Carl G. Richmond, Boston Manufacturers Mutual Fire Insurance Co., Boston, Mass.; W. G. Schultz, fire protection engineer, Lumbermens Mutual Insurance Co., Mansfield, Ohio; Elmer F. Reske, manager, Cook County Inspection Bureau, Chicago.

♦ JOHN S. ROBOHM has been appointed director of vocational education and industrial arts at Minneapolis, Minn.

♦ RAYMOND V. NORD, acting principal of Miller Vocational High School, Minneapolis, Minn., has been appointed principal of both the Miller and the Boys Vocational High School of that city.

♦ RAY BARBER, who has been teaching industrial arts in Holly, Mich., has been promoted to a principalship.

♦ CHESTER BERG reports from Lakewood High School, Battle Creek, Mich., that he is teaching woodwork, metalwork, general shop, and drafting.

♦ DONALD KAISER has been appointed to a position in the public schools of Pontiac, Mich.

♦ JOHN FINCH will teach industrial arts in Wyandotte, Mich.

Association News

♦ The 23rd Annual Conference on Printing Education, was held at the Hotel Pennsylvania, New York City, June 21–23, 1948. The Conference was arranged by the National Graphic Arts Education Association and the Printing Teachers Guild of New York, under the chairmanship of Ferdy J. Tagle, of the New York School of Printing. The program provided for three morning sessions; three afternoon sessions; three intersessions — buffet luncheons and programs — a new conference feature; three evening meetings — a dinner meeting, a testimonial banquet and the graduation exercises of the high school department of the New York School of Printing.

The program was so arranged that every delegate could be present at all of the sessions in order to hear the 66 outstanding leaders in education and industry who addressed the Conference.

The Testimonial Banquet was held in honor of J. Henry Holloway, principal of the New York School of Printing, the first president of the National Graphic Arts Education Association, who, after 50 years of outstanding educational service in New York City's public school system, retires this year. Referring to the great event, the *New York Times*, of June 23, had this to say:

"If Dr. Holloway, in the course of a busy life

had forgotten some phase of his career, it was all brought back to him last night in the Grand Ballroom of the Pennsylvania Hotel where for several hours members of management, labor, education, the graphic arts, civic groups, and students and friends recalled their association. With each remembrance was piled on another farewell honor — gold keys, gold watches, scrolls embossed in gold."

Mr. Holloway was deeply touched by the many and varied honors bestowed upon him, and made a beautiful response, concluding with the words, "Fifty years and it is evening — a glorious evening!"

The Intersessions

For the first time the luncheon periods and one evening dinner were made part of the conference program. The first of these luncheons was put on by the American Type Founders, under the chairmanship of John A. Backus, manager of the department of education. The second of these intersessions was sponsored by the Harris Seybold Company, with Harry E. Porter, vice-president of the firm, in charge. Mr. Porter introduced A. Albert Freeman, who gave an excellent talk on the 1947 books by offset. The conference members were invited to visit the display of the books, which had just opened in New York City.

The third intersession was made possible by the Mergenthaler Linotype Company. Harry L. Gage acted as master of ceremonies, and Wesley Carter, editor of the *Linotype News*, gave a rather unusual talk on "Public Relations for the School of Printing."

On Monday evening, June 21, the Miehle Printing Press and Manufacturing Company gave a delightful Italian dinner to the conference members and their wives at the Caruso Restaurant. A program followed, with Carl Mellick, vice-president in charge of sales, presiding. The motion picture, "Look to the Years Ahead," was shown. Craig Spicher, in charge of sales research and one of our members, spoke briefly and then to the surprise of most of the guests announced that one of our members had just completed 25 years of teaching and was retiring at the end of the school year to take up residence in Arizona. A rising ovation was given to the retiring member, F. J. Christiansen of the New York School of Printing.

The Conference Proper

The first day sessions opened on Monday morning, June 21, with two unusual addresses. The first one was by Irving D. Robbins, of Robbins and Barber, New York City, Public Relations Counsel for Printing Industry of America, who spoke on "Printing and Public Relations." The second was by Prof. Ray Nash, of Dartmouth College, National Chairman of the School and College Program of the American Institute of Graphic Arts, on "Education and Printing." He proposed and outlined a new two-year curriculum, "Master of Graphic Arts," being tried out at Dartmouth, and to be introduced in certain other universities.

President Culver, who presided at the session, introduced a surprise when he presented Frederick Amery to extend the greetings of the British Federation of Teachers of Printing and Allied Subjects to the Conference. Mr. Amery, formerly connected with the Heriot-Watt College, Edinburgh, Scotland, is now a member of the faculty of the Department of Printing, Carnegie Institute of Technology. Mr. Amery made many friends for British printing teachers and for himself during the busy days of the conference.

At the second section the discussion centered on "What Constitutes a Proper Course of Study on Various Levels." The chairman of the committee, Hartley E. Jackson, associate professor of industrial arts, San Jose State College, San Jose, Calif., led the discussion.

Milo Oakland, Northern Illinois State Teachers College, DeKalb, Ill., taking the place of William R. Baker, of Stout Institute, who could not attend, outlined the objectives and subject matter of industrial arts education. John G. Henderson, head of the department of printing at Washburne Trade School, Chicago, gave an unusually interesting slant on what is really meant by graphic arts instruction on the vocational high school level. The teacher training phase was capably discussed by Norman B. Carr of State Teachers College, Trenton, N. J. Professor Stanley C. Hlasta, assistant head of the department of printing, Carnegie Institute of Technology, Pittsburgh, quite properly outlined the management type of training as carried out at Carnegie.

The second day was devoted to modern methods and tools of instruction and looking ahead in the graphic arts. Past President Hupp E. Otto, assistant principal of the McKinley Vocational High School, Wheeling, W. Va., presided over the morning session, June 22. Irwin M. Campbell, of the industrial arts department, Central Michigan College, Mount Pleasant, Mich., presented many books and pamphlets to give meaning to his address on "A Survey of Present Day Educational Literature."

Dr. Edward C. Estabrooke, educational director of American School and American Technical Society, Chicago; and Dr. E. Burnham Dunton, assistant manager, A.T.F. Department of Education, Elizabeth, N. J., spoke on testing, as related to graphic arts education.

The afternoon session, under the chairmanship of past president C. Harold Lauck, Journalism Laboratory Press, Washington and Lee University, Lexington, Va., was devoted to "Looking Ahead to New Equipment and New Developments in Graphic Arts Research." At this session Glen C. Compton, of Robbins and Barber, presented a clear picture of many of the new printing processes and materials and showed their relation to education of today and tomorrow.

The final sessions maintained a high level of

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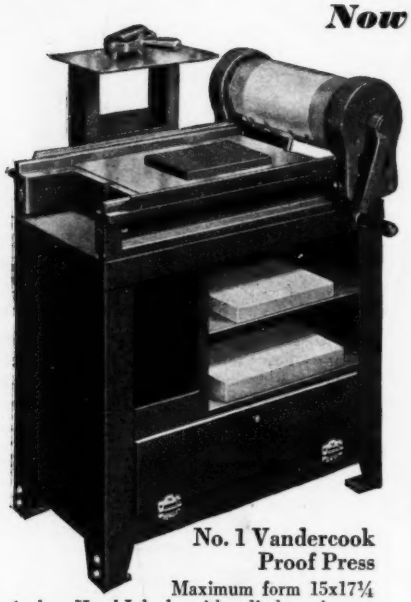

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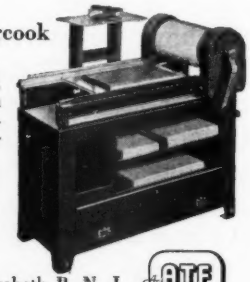

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interest and held the interest and attendance of delegates to the very end. Past president Chester A. Lyle, head of the department of printing, Timken Vocational High School, Canton, Ohio, called to order the panel session on Wednesday morning, June 23, on "The Voice of Industry and the Voice of Education." The purpose of the session was to get the viewpoint of industry leaders as to what training is needed for the composing room, for presswork, and for the bindery, and to show how the schools of printing are meeting the training needs.

The industry panel consisted of Charles J. Felten, typographic consultant, Kurt H. Volk, Inc., New York City, author, lecturer, and teacher; T. G. McGrew, manager of membership relations of the New York Employing Printers Association; and Walter Kubilius, research director of Bookbinding & Book Production.

Edward L. O'Gorman of the New York School of Printing, and James A. Gahan, of the School of Graphic Arts, Montreal, Canada, told how schools are teaching the composing room subjects. Francis X. Robinson of the New York School of Printing, outlined the program of pressroom instruction, and Gerhard Gerlach, instructor of book arts, School of General Studies, Columbia University, gave a presentation of bindery operations from the standpoint of the school.

In the afternoon, past president Allan Robinson, principal of the Mergenthaler Vocational High School of Printing, Baltimore, presided over the closing session, the general topic of which was "New Developments in Graphic Arts Education." There were five speakers. Ormand E. Demorest, director of apprentice training, Government Printing Office, Washington, D. C., gave an excellent historical sketch of apprentice training at that institution. James J. Rudisill spoke on "The P.I.A. Educational Courses," and Harry L. Gage on the 1948–49 program of the Advisory Council on Graphic Arts Education.

The officers elected for the coming year are: president, John G. Henderson, Washburne Trade School, Chicago, Ill.; vice-president, Hartley E. Jackson, San Jose State College, San Jose, Calif.; secretary, Patrick F. Boughal, the New York School of Printing, New York City; treasurer, Vincent C. Coyne, Middlesex County Vocational School No. 1, New Brunswick, N. J.; educational director, Fred J. Hartman, National Graphic Arts Education Association, Washington, D. C.

Information about time and place for next year's convention will be given later.

♦ The twelfth annual convention of the Wisconsin Association for Vocational and Adult Education was held on May 6, 7, and 8, 1948, at Green Bay, Wis. The directors' meeting was held on May 6 at which time the following subjects were discussed: "Report of Research and Instructional Material Committee"; "Post-High School and Terminal Education"; "Status On-the-Job and Apprenticeship Training"; "Home Bound Program in Wisconsin"; "A Sound Public Relations Program"; "Our Circuit Relations Program"; and "State Plans and Annual Reports."

The opening general meeting was held on May 7 at which time D. M. Mobley, state director, Georgia, spoke on the subject "Vocational Education in Postwar Germany, As I Saw It." "Education for Democracy's Last Stand," was presented by C. M. Miller, state director, Kansas.

Talks were given at the meeting of the co-ordinator section. One was given by Miss Mary A. Logan, personnel director of the H. C. Prange Co., Green Bay, Wis. Miss Logan spoke on the subject, "Co-ordination and the Personnel Director." The second talk was given by Charles Pagnucco, training director of the Kohler Co. at Kohler, Wis. He spoke on "Human Relations and the Co-ordinator."

In the homemaking section, Dr. Alma Long, director of education and applied psychology, Purdue University, spoke on "Growing Up Socially." George Walters, department of education, Lawrence College, Appleton, Wis., spoke on "Guidance in Our Everyday Teaching."

Wilbur G. Carlson, Madison, Wis., assistant to the president of the Kraft Foods Co., spoke on "Public Relations — What It Can Mean to Rehabilitation."

The business education section speaker was J. E. TePoorten, co-ordinator of occupational extension training, Wisconsin Vocational Schools. TePoorten spoke on the topic, "Business Training for Whom?"

The local board members' and directors' section was addressed by Raymond Rice, assemblyman, La Crosse County. Rice spoke on the subject, "Wisconsin's Century of Progress." Dr. Wm. F. Rasche, director, Milwaukee Vocational School, spoke on "Plans for the A.V.A. Convention."

The combined co-ordination, trades, and industry section was addressed by a panel of speakers consisting of Martin Wesolowski, state staff, whose subject was "Means of Educating Advisory Committees for Related Programs"; Glenn Fiedler, Green Bay, spoke on "Dairy Foods and the Cheesemaker"; G. S. Strombeck, Racine, spoke on "The Printer"; Wm. Leuth, Sheboygan, on "The Meatcutter"; E. H. Funk, Appleton, on "Related Training for the Central Fox River Valley Schools"; Walter H. Gmeiner, Kaukauna, spoke on "Masons"; and A. V. Karpowitz, Milwaukee, on "The Place of a Socio-Economic Course in an Apprentice Curriculum."

The agriculture section speakers were W. D. Knox, associate editor, *Hoard's Dairyman*, who spoke on "An Editor Looks at Vocational Agriculture"; M. D. Mobley, director, vocational education, who spoke on the subject, "National Aspects of Vocational Agriculture."

A round-table discussion was held at the sheet-metal section at which time the discussion centered around the topic, "Do Our School Shop Projects Conform to Trade Shop Practices?"

The speaker of the drafting section was George Pheil, McGraw-Hill Book Co., who presented the films which are based on the text, "Engineering Drawing," by T. French.

The round-table discussion in the electrical

(Continued on page 28A)

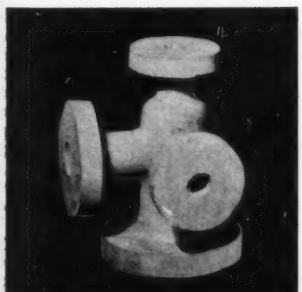
FIRST IN ALUMINUM!

Here are the winners of the 1947-48 Aluminum Projects Competition

CAST

GROUP 1—1st prize of $50 to James Jones, age 15. School: Harrison Technical, Chicago, Ill. Teacher: P. Becker. Principal: Louis F. Brook.

GROUP 2—1st prize of $50 to Ernest Mills, age 16. School: Haddonfield Memorial, Haddonfield, N. J. Teacher: B. W. Stratton. Principal: Thomas Skirm.



GROUP 3—1st prize of $50 to William Hansbury, age 17. School: Dobbins Vocational, Philadelphia, Pa. Teacher: Edward Saks. Principal: J. Norwood Baker.

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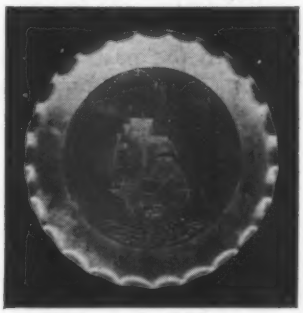
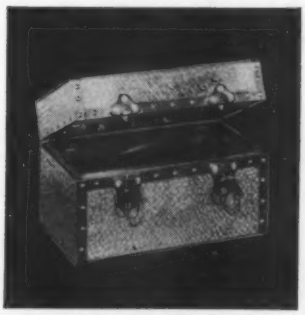
GROUP 1—1st prize of $50 to Rodman Sowers, age 17. School: McKinley Occupational, Dayton, Ohio. Teacher: James O. Reynolds. Principal: A. R. Pitsinger.



GROUP 2—1st prize of $50 to John F. Sullivan, age 16. School: Southwest High, Kansas City, Mo. Teacher: John R. Manly. Principal: Albert H. Mansees.



GROUP 3—1st prize of $50 to Melvin Stickelmeyer, age 17. School: Spokane Trade, Spokane, Wash. Teacher: S. Gilbert Cook. Principal: E. J. Griffin.

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(Continued from page 26A)

section was on the subjects of "The Relation of Instruction to Actual Trade Practice," "Promotion and Maintenance of Trade Extension Classes," and "Setting Time Standards for Apprentices."

The round-table discussion of the printing section was on the topic, "Integration of Training with Industries' Educational Programs."

The general subjects section speaker was Mrs. W. A. Titus, Fond du Lac, Wis., who spoke on "The Present Crisis in Education."

The secretaries' and office workers' section was addressed by C. W. Winegarner, circuit instructor, Wisconsin Schools of Vocational and Adult Education, whose topic was "How Do You Do?"

The officers of the Wisconsin Association for Vocational and Adult Education who were elected are:

President, Ted Sather, Kenosha; secretary-treasurer, C. D. Rejahl, Madison; past president, F. E. Just, Janesville.

The following vice-presidents also were elected: Marie H. Peterson, La Crosse, Commercial; Martin Wesolowski, Madison, teacher training; Wm. N. Lathrop, Milwaukee, co-ordination; Carl J. Haase, La Crosse, rehabilitation; John Perkins, Neillsville, agriculture; Raymond Henke, Marinette, trade and industry; Mabel Mahoney, Fond du Lac, general subjects; Leona Bovee, Stevens Point, homemaking; and Jacob Spies, Sheboygan, directors.

♦ The Michigan State Committee on Industrial Arts Education held the final meeting for the 1947–48 school year at the home of Miss Alma Goetsch near Okemos, Mich., May 7.

Merrill Hamburg, supervisor of industrial arts, Detroit, newly appointed member of the committee, and Mr. Silverstone, co-ordinator of vocational education, Ann Arbor, were present. Mr. Hamburg was asked to assume the chairmanship of the subcommittee on teaching methods.

It was agreed that concise, well-developed bulletins covering various aspects of industrial-arts education be released periodically to make the public, general educator, administrator, and shop instructor aware of what constitutes good industrial-arts teaching.

Plans were made for the development of the first release. These would be comprised of a series of descriptive statements of teaching units built around a definite industrial-arts area to show, by contrast, the method by which a "traditional" teacher and a "master" teacher would develop the project involved. Various members of the committee were assigned projects in different areas to be written up during the summer and presented at the first meeting in the fall. The tentative date for the next meeting is October 29, 1948.

♦ On Saturday, July 31, the Mu Sigma Pi graduate professional fraternity in industrial education at Wayne University held its summer initiation at the Wardell-Sheraton Hotel in Detroit, Mich.

William Bettencourt from Belmont, Mass., was the general chairman. Ralph Wenrich, assistant superintendent of public instruction in charge of vocational education in Michigan, gave an inspiring illustrated lecture on the "Educational Program in Austria"; he has just returned from a three-month assignment with the War Department there.

Left to right: Stanley Sweet, Ronald Thomas, Horace Charles, Morgan Wilcox, Ralph Williams

Another high light of the banquet was the receipt of a gavel made for the Mu Sigma Pi Fraternity by Owen Mesner from an elm taken from George Washington's estate. Mesner teaches industrial arts in the Berkeley Springs High School, Berkeley Springs, W. Va. Men in our profession will be interested to know that Mesner also made the gavels for the Democratic and Republican National Conventions this year from the same tree. Andrew Althouse, faculty adviser for the Mu Sigma Pi, accepted the gavel on behalf of the membership.

Earl L. Bedell, divisional director of vocational education in the Detroit Public Schools, was toastmaster on this occasion.

Dr. Waldo E. Lessenger, dean of the College of Education, briefly reviewed several of the projected plans for vocational education at Wayne University.

The following men were selected for membership in this honorary fraternity: Horace J. Charles, Buffalo, N. Y.; Stanley W. Sweet, Bronson, Mich.; Morgan E. Wilcox, Wray, Ga.; Ronald B. Thomas, Charleston, W. Va.; and Ralph G. Williams, Braidenton, Fla.

— *G. Harold Silvius*

♦ Epsilon Pi Tau, Inc., International Honor Society in Industrial Arts and Industrial-Vocational Education, University Sta., Box 3111, Columbus 10, Ohio, because of the January, 1948, vote concerning an executive committee and a regional plan of organization, plus recent and current installations, has made necessary the following directory. The fraternity now has 28

(Continued on page 31A)

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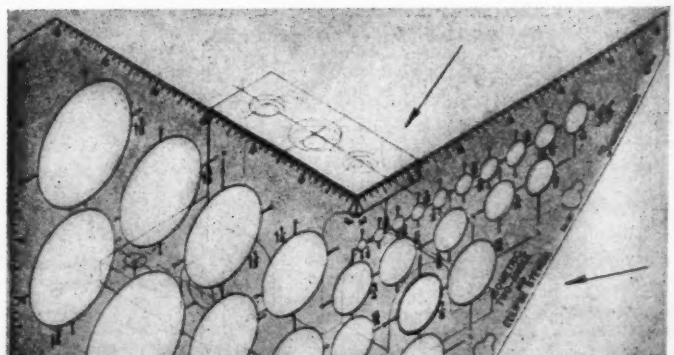

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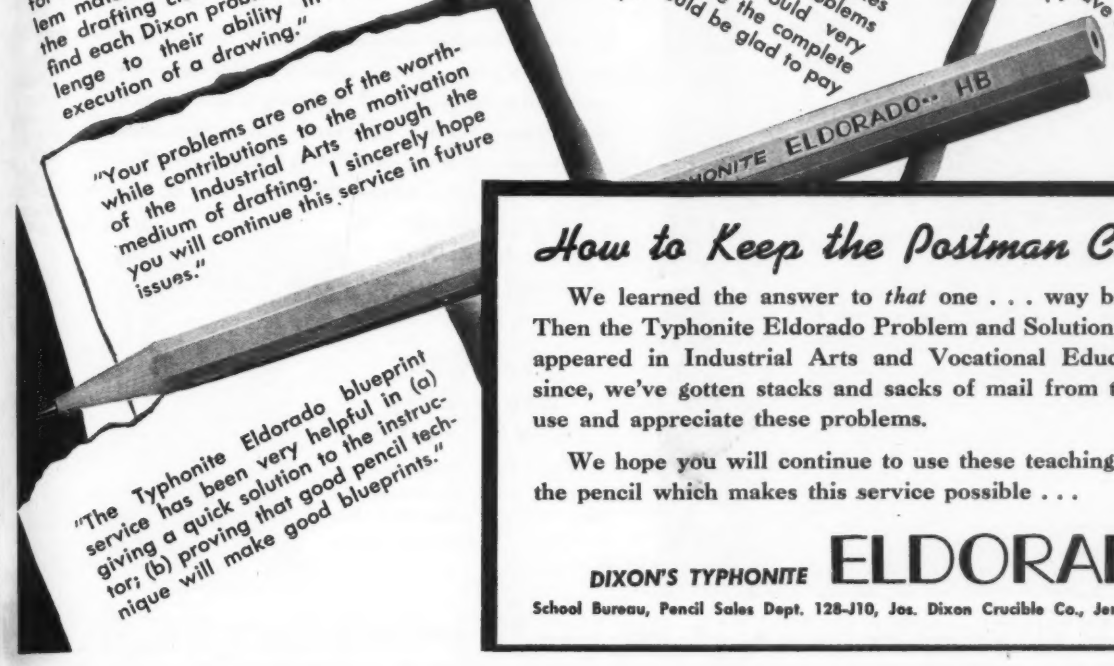

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(Continued from page 28A)

chapters, but an additional field chapter or two is needed, such as in New York City, Washington, D. C., and the like, to the unit in Los Angeles.

Additional governors are to be elected as other regions are entered. Dr. Wilber will serve as governor of the northeastern states region as well as chairman of the board. Dr. Warner and Professor Harrison will share the populous Great Lakes region. The secretary is an employee and, therefore, not listed.

Executive committee: Dr. Gordon O. Wilber, *chairman of the board of trustees,* State Teachers College, Oswego, N. Y.; Dr. William E. Warner, *president of the fraternity,* Ohio State University, Columbus 10, Ohio; Dr. Heber A. Sotzin, *governor of the Pacific region,* State College, San Jose, Calif.; Dr. Otto A. Hankammer, *governor of the Plains region,* State Teachers College, Pittsburg, Kans.; Professor Paul E. Harrison, *governor of the Great Lakes region,* State Teachers College, DeKalb, Ill.

Members of the board of trustees: ALPHA — Dr. William E. Warner, Ohio State University, Columbus 10, Ohio; BETA — Dr. Fred J. Schmidt, Jr., Ball State Teachers College, Muncie, Ind.; GAMMA — Dr. William D. Stoner, Miami University, Oxford, Ohio; DELTA — Professor George B. Cox, State College, Corvallis, Ore.; EPSILON — Professor Arthur E. Purinton, State Teachers College, Fitchburg, Mass.; ZETA — Professor Paul E. Harrison, Northern Illinois State Teachers College, DeKalb, Ill.; ETA — Professor Albin V. Larson, State Teachers College, Peru, Neb.; THETA — Dean Clyde A. Bowman, The Stout Institute, Menomonie, Wis.; IOTA — Dr. Russell H. Landis, Eastern Illinois State College, Charleston, Ill.; KAPPA — Professor Russell B. Kidder, State College, Chico, Calif.; LAMBDA — Professor Charles R. Kinison, Ohio University, Athens, Ohio; MU — Professor Arthur H. Luehring, State Teachers College, Terre Haute, Ind.; NU — Dean C. E. Partch, Rutgers University, New Brunswick, N. J.; OMICRON — Professor Fred M. Richmond, State Teachers College, Newark 4, N. J.; PI — Professor Harold G. Palmer, State Teachers College, Cedar Falls, Iowa; RHO — Dr. Heber A. Sotzin, State College, San Jose, Calif.; SIGMA — Professor Francis C. Osborn, State College, Flagstaff, Ariz.; TAU — Professor Irving C. Perkins, State College for Teachers, Buffalo 13, N. Y.; UPSILON — Professor Kenneth L. McFarland, Institute of Technology, Montgomery, W. Va.; PHI — Dr. Gordon O. Wilber, State Teachers College, Oswego, N. Y.; CHI — Professor Coleman Hewitt, Chicago Teachers College, Chicago 21, Ill.; PSI — Professor Anthony T. Stavaski, State Teachers College, California, Pa.; OMEGA — Professor Ralph D. Sellhorn, State Teachers College, Wayne, Neb.; ALPHA-ALPHA — Dr. Otto A. Hankammer, State Teachers College, Pittsburg, Kans.; ALPHA-BETA — Professor E. E. Ericson, University of California, Santa Barbara, Calif.; ALPHA-GAMMA — Professor R. M. Torgerson, State University, Bowling Green, Ohio; ALPHA-DELTA — Professor William A. Bakamis, The State College of Washington, Pullman; *Los Angeles Field Chapter* — Mr. Claude Nihart, Board of Education, 1205 West Pico Boulevard, Los Angeles 15, Calif.

Additional chapters are pending in: Connecticut, Illinois, Kansas, Louisiana (2), Ohio, Oklahoma. and Virginia.

EPT will play a fellowship role again this year in meetings of the American Vocational Association (Milwaukee), the American Association of School Administrators (Philadelphia and San Francisco), the American Industrial Arts Association (St. Louis), and the National Education Association of the United States (Boston).

♦ The vocational sessions of the school and college division program of the thirty sixth National Safety Congress and Exposition, to be held in Chicago, Oct. 18–22, 1948, will present many discussions that will be of special interest to all who are engaged in any way with industrial arts and vocational education.

At the Monday afternoon session the problem of conserving life as a challenge to the schools will be discussed. It will also be shown how the schools meet this challenge as far as the state, and the large, medium, and small city is concerned.

Monday evening will be devoted to a supervisory section, discussing research findings, safe driving, and legislation and safety regulation.

Tuesday morning and afternoon the question on how to teach safety on the elementary level will be discussed.

Wednesday, both morning and afternoon, will be devoted to the marshaling of student and faculty forces in providing a complete high school safety program.

The A.V.A. National Safety Council will discuss how to improve safety instruction in vocational education in the fields of homemaking, agriculture, industrial arts, distributive education, and trade and industry.

On Thursday morning and afternoon safety education for the prospective teacher will be discussed.

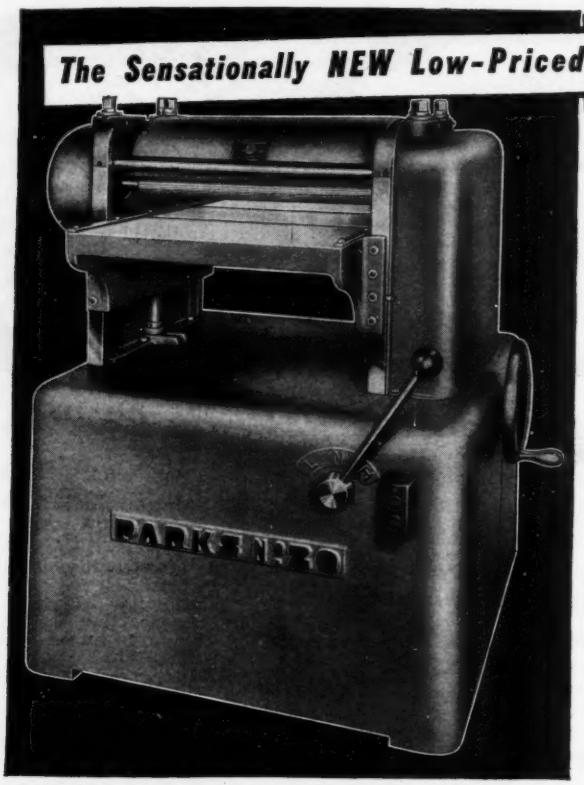
♦ The twelfth annual National Time and Motion Study Clinic, sponsored by the research division of the Industrial Management Society, will be held November 4 and 5 at the Sheraton Hotel, 505 N. Michigan Ave., Chicago, Ill. General chairman of the clinic is Ralph H. Landes. Address inquiries to the Industrial Management Society, 176 W. Adams St., Chicago 3, Ill.

♦ The twenty eighth annual convention of the National Society for Crippled Children & Adults, Inc., will be held at the La Salle Hotel, Chicago, November 15–17.

Many outstanding speakers in the fields of medicine, health, and education will be on hand to present facts on progress in work with the handicapped during the past year.

The convention will be attended by physicians, therapists, educators, workers with the handicapped, and representatives of National Society's more than 2000 state and local units throughout the United States, Canada, Alaska, and Hawaii.

The Sensationally NEW Low-Priced



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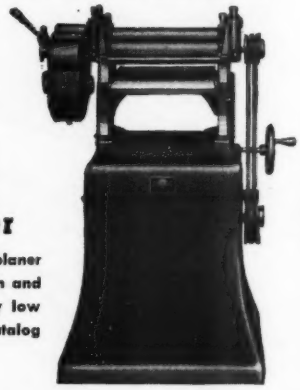
Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.



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A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.

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Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEW STANLEY NO. 88 SCREW-DRIVER BIT HOLDER

Stanley Tools, New Britain, Conn., announces its Replaceable Bit Screw Driver No. 88 for driving both Phillips and slotted head screws. This driver features a hollow handle compartment which contains three bits, two for Phillips screws

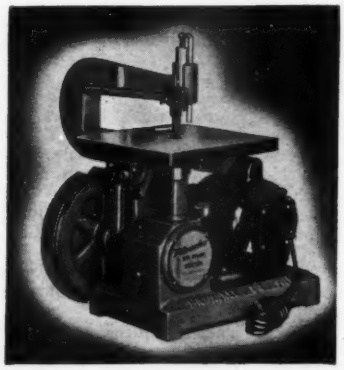
Versatile screw driver

and one for slotted screws. Just select the right bit, insert it and the driver is ready for the toughest kind of work. Polished steel bar is hardened and tempered. Screw cap is aluminum. Hardwood handle has attractive natural finish. It is a practical addition to the tool kit or production line since it provides one driver which will seat a large range of screws. Other bits are available to fit No. 88 Tool Holder.

For brief reference use IAVE—1001.

FILING MACHINE WITH ALL-PURPOSE OVERARM

This new bench-type reciprocal filing machine, Model FS, performs all three diemaking operations, filing, sawing, and lapping, without changing overarms. This is made possible by the new, deep-throated, overarm equipped with an upper chuck in the overarm assembly. This overarm also permits chucking close to the work piece, thereby assuring greatest possible rigidity of saws and files.



All-purpose overarm filing machine

The lower chuck, with its ball joint, permits perfect alignment of files with warped, crooked, or twisted shanks before they are rigidly clamped in working position. Caps have serrated faces, with V grooves, to grip and align files, saws, or stones of any size or shape.

The overarm can be released and swung clear of the table for frequent and speedy inspection and checking of the work piece. An adjustable stop assures immediate return to the original setting, thus insuring careful workmanship and frequent checking. The worktable is mounted on two brackets and may be tilted 15 deg. in four directions for accurate filing or sawing of compound angles. An adjustable hold-down finger holds the work flat against the worktable in any position.

This machine is known as the Milwaukee die filer, Model FS. A companion machine, Model F, recommended for filing only, is equipped with improved file roller support and adjustable hold-down finger. Both are manufactured by the Rice Pump and Machine Co., 1023 S. 40th St., Milwaukee 4, Wis. This firm also manufactures the Milwaukee profile grinder. New, illustrated bulletins covering all three machines are available.

For brief reference use IAVE—1002.

NEW SOUTH BEND LATHE WORKS

South Bend Lathe Works has announced that production of a new 7-in. precision bench shaper will start in midyear. Production of a new 14-in.

New South Bend shaper

drill press was announced on January 1. Both of these new items are marketed in addition to the regular 9, 10, 13, 14½, 16, and 16/24-in. swings South Bend precision lathes; attachments and accessories, many of which are new items; and tools.

Further information can be obtained by writing the South Bend Lathe Works, 178 East Madison St., South Bend 22, Ind.

For brief reference use IAVE—1003.

SHEET METAL TOOLS FOR THE SMALL SHOP

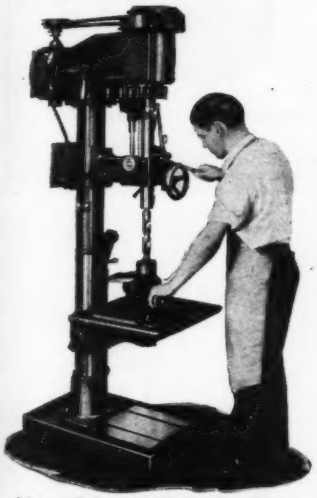
Five tools with accessories for sheet-metal fabrication, built especially for the hobbyist and the school shop for fabrication of metals in light gauges, has been put on the market by the Berkroy Products, Inc., Burbank, Calif.

This interesting set of tools consists of a nibbler, brake, shear, slip roll, and hand punch. These tools make it possible to do real craftsmanlike work with light-gauge sheet metals.

For brief reference use IAVE—1004.

THE NEW C-20 DRILLING MACHINE

The new model C-20 drilling machine, which is illustrated and described in catalog No. 67, has a selection of spindle speeds, ranging from 400 r.p.m. to 1360 r.p.m., in direct drive, and from 65 r.p.m. to 225 r.p.m. in back gear. Sturdy construction and the 2 h.p. motor furnished with this machine provide the stamina to drill up to 1½ in. in steel. At the same time, the machine is so designed that it is sufficiently sensitive for lighter drilling operations.



New C-20 drilling machine

A guard completely enclosing the V belt on this machine has been designed especially for installation on machines purchased for use in the shops of schools and colleges. This feature is not illustrated in Catalog No. 67, but it has been shown in a recent advertisement in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The standard spindle of this machine is furnished with No. 3 Morse Taper, but No. 4 Morse Taper will be furnished without additional charge.

The price of this new Model C-20 drilling machine is well within the budget provided by most schools.

A postal card addressed to Sibley Machine & Foundry Corp., South Bend 23, Ind., will bring you the catalog, or the nearest dealer will be asked to send a representative to call on you at your convenience to discuss the various features of this machine.

For brief reference use IAVE—1005.

GUILD SAW AGAIN ON THE MARKET

The Porter-Cable Machine Co., Syracuse 8, N. Y., announces that the 4½-in. guild saw, Model A-4, withdrawn from production during the war, has been reintroduced with several new features. The saw can be tilted to 45 deg. for

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The Shop Scoop of '48
for Professional-looking Projects
2 New Speed-Grits Sanders
by Behr-Manning
Here are two efficient new shop tools which combine everything "in the book" that spells professional-looking projects: First — the instant appeal of true usefulness — practical, foolproof, camera-type magazine-loaded hand sanders for finishing wood, furniture, plaster, metal, plastics, or paint. Second — the assurance of good functional design — the true flat resilient neoprene contact pad, securely cemented to the indestructible plastic body, produces infinitely better finishes than old-fashioned hand-sanding. Third — choice of 2 sizes, #12, with a sanding area of about 7" x 2", and #6, 5" x 1⅜". They are made in five rich colors — red, blue, yellow, green, and black.
These smart new Sanders are a "must" for every well-equipped school shop — and they're reasonably priced too — $1.25 for #12, and $1.00 for #6. Ask your distributor to include Speed-Grits Sanders in your next order.
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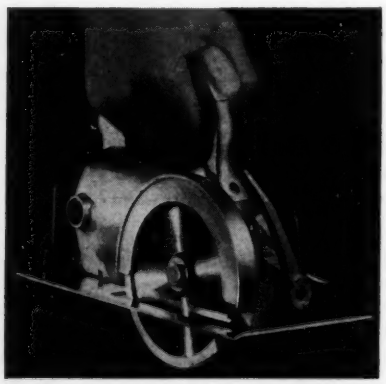
bevel or compound miter cuts, and an adjustable ripping guide makes fast, accurate ripping simple and fast.

The saw also can be used for dadoing, cutting tenons, grooving, and notching. It can be raised or lowered into the work. As a safeguard to operator safety, the blade is protected at every angle — teeth are exposed only where they are actually cutting.



Model A-4 guild saw

The Model A-4 guild saw weighs only 6¾ lb. Because of this light weight, operator sawing fatigue is largely removed. The capacity of the guild saw is a full 1¼ in. on straight cutting, and 1 in. at a bevel of 45 deg. The saw blade is 4½ in. in diameter, and is driven by a universal motor operating on either a.c., or d.c., up to and including 60 cycle, standard 110 volt. It is equipped with ball bearings throughout. The over-all size of the model A-4 is length, 10½ in.; width, 4½ in.; and height, 8 in.

For further information write the Porter-Cable Machine Co., 1714 N. Salina St., Syracuse 8, N. Y.

For brief reference use IAVE—1006.

SEBASTIAN LATHES NOW MADE BY AMERICAN STEEL FOUNDRIES

King Machine Tool, now a division of American Steel Foundries, is devoting its modern plant facilities and long-accumulated machine tool experience to the manufacture of Sebastian Lathes as well as world-renowned *King* Vertical Boring and Turning Machines.

Sebastian lathes now made by the King Machine Tool Company

The new King-made Sebastian Lathes are available in a variety of types and sizes: General Purpose, Clutch-and-Brake, and Line Shaft Drive types in sizes 12, 16, and 20 in.; Gap and Metric Screw types in sizes 16 and 20 in. All are equipped with eight-speed geared head.

Among principal features which make the Sebastian Lathe a leader in the medium-priced field are: Timken Tapered Roller Bearings on all shafts in the headstock; apron control for start, stop, and reverse of spindle; knob control handle for apron-length feed friction; 57 feed and thread changes; accuracy .0005 in. at every point of alignment.

A large number of items are furnished as standard equipment, included in basic price of a Sebastian Lathe — more, it is claimed, than with any other lathe of its type. Among these are apron control, steady rest, threading dial, and two faceplates.

Engineering specifications and details of all features will be sent promptly on request. Write American Steel Foundries, King Machine Tool Division, Cincinnati 29, Ohio.

For brief reference use IAVE—1007.

ROBERT C. STUCKER APPOINTED VICE-PRESIDENT

Robert C. Stucker, who has been associated with the Brodhead-Garrett Co. for more than 20 years, has been appointed vice-president to fill the vacancy caused by the death of Miss Anna L. Brodhead. Mr. Stucker represented the company in New England and eastern seaboard states for many years as district manager, and in 1946 was recalled to the home office as sales manager.

KEARNEY TRECKER PURCHASES WALKER-TURNER COMPANY

Kearney & Trecker Corp. of Milwaukee, builders of machine tools for milling and boring, has purchased the Walker-Turner Co. Inc., of Plainfield, N. J., who manufacture a line of light machine tools for industrial and home workshop uses.

The Walker-Turner plant will continue its operations as the Walker-Turner division of Kearney & Trecker. All facilities will remain in Plainfield and general supervision will continue under the present management.

School Librarians . . .

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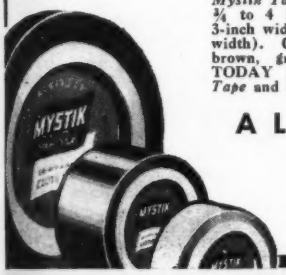

Mystik Tape is available in widths ranging from ¾ to 4 inches. (Average size books use the 3-inch width and reference books take the 4-inch width). Color range includes white, black, brown, green, red, blue and wine. WRITE TODAY for other Library uses for *Mystik Tape* and Price List.

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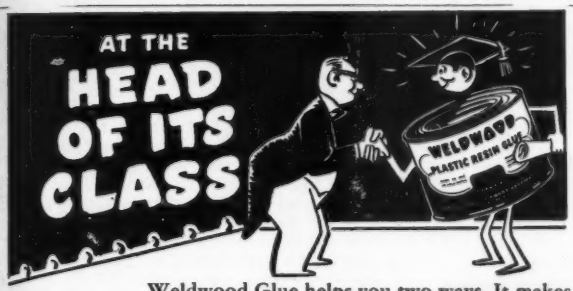

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Weldwood Glue mixes quickly with cold tap water. It spreads smoothly and easily. And it sets so fast that jobs can be handled, even light-worked, a few hours after clamping. Result? No waste. No fuss or muss. More time for more projects.

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MACHINE WOODWORKING — Smith
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Revised 1947. Complete textbook for general metals. $4.00

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Delmar Publishers, Inc.
Albany 1, New York

Questions and Answers

COURSE OUTLINES

1126. Q.: I would like to secure a job analysis chart or curriculum in woodworking similar to the one outlined for plumbing in the March, 1948, issue. — *J. M. W.*

A.: We do not have exactly what you want, but the following references to past copies of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine may help you.

Course Outlines
April, 1940, p. 168 — Elementary General Woodwork
January, 1941, p. 13 — Course in Industrial Carpentry
September, 1947, p. 285 — State Syllabi in Industrial Arts
October, 1947, p. 321 — State Syllabi in Industrial Arts
November, 1947, p. 364 — Organizing Technical High School Woodworking Courses
March, 1948, p. 102 — Analysis Chart for Plumbing Apprentices
March, 1948, p. 110 — Course Outline for Related Subjects in Carpentry (continued in May issue, p. 186, and June issue, p. 227)
Course of Study
August, 1927, p. 304 — Tryout Course in Cabinetmaking
March, 1927, p. 91 — A Course in Patternmaking
March, 1940, p. 109 — Course of Study for Industrial-Arts Woodwork. — *J. J. M.*

ARTICLES ON TOOL ROOMS, PANELS, AND RACKS

1127. Q.: I am looking for suggestions on tool rooms, panels, and racks. Would you kindly refer me to articles on these subjects that have appeared in past issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION? — V. H. B.

A.: Articles of the kind you are looking for appeared in the following issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION:

Tool Panel
November, 1942, p. 389 — Useful Tool Panels
October, 1943, p. 347 — A Tool Panel for the General Shop
April, 1945, p. 166 — Wood-Turning Tool and Accessory Boards
March, 1948, p. 100 — Localized Tool Panels
Tool Rack
October, 1920, p. 417 — Tool Rack
September, 1921, p. 360 — Tool Racks
July, 1922, p. 286 — Tool Racks
December, 1922, p. 480 — Tool Racks
May, 1923, p. 203 — Saving Time for the Tool Checker
May, 1925, p. 195 — Tool Distribution in School Shop
August, 1931, p. 299 — Portable Tool Rack
September, 1937, p. 307 — Portable Tool Rack
September, 1941, p. 306 — Tool Rack for the Mechanical-Drawing Room
Tool Room
January, 1920, p. 12 — Shop Efficiency
February, 1921, p. 66 — Toy Truck as a Grade Woodwork Project
June, 1921, p. 207 — Co-operation of the Shop and Classroom
July, 1922, p. 286 — How Tools Are Cared For in Ellensburg, Wash.
December, 1922, p. 479 — Shop Building of the High School at Appleton, Wis.
November, 1941, p. 396 — A Toolroom Report
December, 1947, p. 438 — Dressing up the Toolroom — *J. J. M.*

News Notes

♦ Both houses of Congress have taken final action on the appropriations for vocational education for the school year beginning July 1, 1948. These appropriations are carried in the bill which provides for all appropriations through the U. S. Office of Education. The bill is the large appropriation measure carrying appropriations for the coming year for the Labor Department and the Federal Security Agency, of which the U. S. Office of Education is a part. The president has signed the bill.

Appropriations for the further development of vocational education under the George-Barden Act are in the amount of $19,842,759.97. This is an increase of $508,818 over the appropriations of the school year just closing. It is almost six million dollars more than the appropriations available under the George-Deen Act. These appropriations are in addition to the appropriations for vocational education under the Smith-Hughes Act. The two Acts together for the coming year make a total of over 26 million dollars for vocational education.

♦ The Denver Public Schools, Denver, Colo., played host to some 250 key men from industries in the Denver area. The clinic lasted for seven days. The first two days were general meetings, each being attended by about 100 men. This was followed by a week of evening classes — 25 men to a class — held at the Emily Griffith Opportunity School. These sessions lasted from 7:00 p.m. to 10:00 p.m. Each 25-men class opened with the Carboloy Company's sound motion picture, "Everyday Miracles," then continued with talks, demonstrations, and instruction in grinding, brazing, cutting techniques, and application and maintenance problems. Carboloy repre-

(Continued on page 38A)

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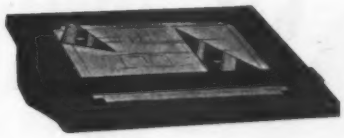

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(Continued from page 36A)

sentatives William Powell and Carl Bland worked closely with Kenneth E. Oberholtzer, superintendent of Denver schools; Russell Britton, director of vocational education; and Stacy C. Hinkle, assistant manager of the Mine and Smelter Supply Co., in making the clinic a success.

♦ One-week driver training seminars were arranged for college instructors of teacher-training institutions, by the American Automobile Association at various universities during the past school year.

These seminars were conducted to train college professors so that they can return to their respective colleges and in turn give teacher-training courses for high school teachers, either during college summer terms or during the regular college year.

Local AAA clubs have provided many high schools having qualified instructors with dual-control cars.

For further information on these instructor and student safe driving courses address the American Automobile Association, Pennsylvania Ave., at 17th St., Washington 6, D. C.

♦ Aluminum nails in six types and sixteen different sizes are now being made for the building industry by Reynolds Metals Co., Louisville, Ky. These nails have sufficient strength for any purpose and are suitable for use with most types of building materials.

Aluminum nails carry a number of inherent advantages which make them of special value to the building trade. In the first place, they weigh only one third as much as steel nails which means that the buyer gets three times as many nails per pound. This reduction in weight will also result in lowered transportation charges.

In addition aluminum nails are highly resistant to corrosion and stain. This means that when they are used with wood siding there is no danger of rusting of nailheads with subsequent unsightly discoloration of paint jobs on exterior walls.

♦ On August 15 the eleventh annual All-American Soap Box Derby was run before more than 75,000 spectators. The Derby, sponsored annually by the Chevrolet Motor Division and by leading American newspapers, had entries from 148 communities of the United States, Canada, Alaska, and Panama. Each entry in the Akron finals was the champion from his home town, and each boy has returned to his home after the national event still a champion.

The new national champion is tow-headed, 13-year-old Donnie Strub, of Warren, Ohio. His award was a four-year college scholarship, given to him by T. H. Keating, general sales manager, Chevrolet Motor Division. The second place winner received a Chevrolet sedan.

♦ This month for the fifth consecutive year, boys and girls from the 25,000 high schools in the United States, Alaska, Hawaii, and Puerto Rico will be given an opportunity to take part in the 1949 Pepsi-Cola scholarship program under which 119 four-year college scholarships and 600 college entrance prizes, totaling $350,000, will be awarded to seniors who give promise of leadership in their chosen fields.

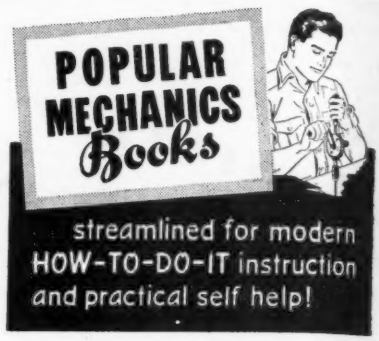
Any high school senior who wants to try for one of these awards can see his or her principal who has been sent complete information about the program.

♦ Nearly 600 sources of 16mm. films for teachers and school administrators are listed in a 28-page directory recently issued by the Office of Education, Federal Security Agency.

The listing of film libraries is based on answers to inquiries sent to film libraries, visual-education dealers, and other film distributors of 16mm. films. Each distributor listed has indicated (1) that he loans or rents films, (2) that he wishes to be listed, and (3) special restrictions or limitations on his distribution of films.

Copies of the directory, entitled "A Partial List of 16mm. Film Libraries," are available without cost from the Visual Aids Section of the Office of Education, Federal Security Agency, Washington 25, D. C.

(Continued on page 40A)



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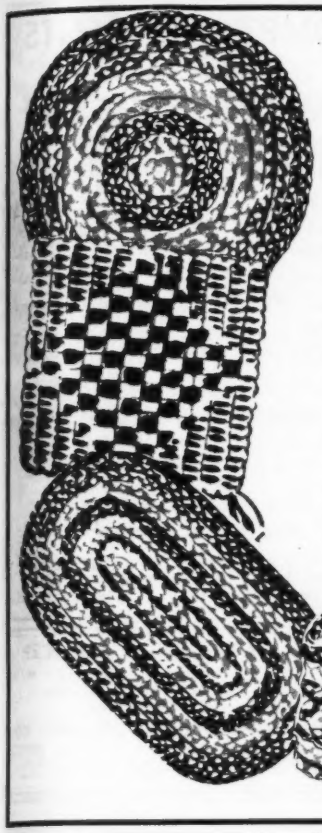

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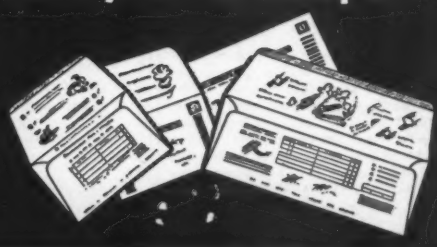

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(Continued from page 38A)

♦ The California State Personnel Board announces an examination for consultant in industrial-arts education.

Entrance requirements: All applicants must be United States citizens and have been residents of California for at least one year immediately prior to the date of the examination.

Possession of a valid regular special secondary credential in industrial-arts education and a valid regular special subject school supervision credential in industrial-arts education or credential or life diploma of equivalent authorization issued under the authority of the California State Board of Education. (Applicants who do not possess the required credentials will be admitted to the examination, but must secure the credentials before they will be considered eligible for certification from the employment list.)

Experience: Five years of teaching experience in industrial-arts education. (Supervisory or administrative experience in industrial-arts education may be substituted for the teaching experience on the basis of one year of supervisory or administrative experience being equal to two years of teaching experience.)

For further information address the California State Personnel Board; 1015 L St., Sacramento, Calif.

BOOK MANUSCRIPT CONTEST

The American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill., announces its 1948–49 Book Manuscript Contest, the objective of which is to co-operate with the Commission on Life Adjustment Education of Youth:

This is a textbook manuscript contest. Manuscripts that are better adapted for publication as magazine articles, booklets, or pamphlets will not be considered for this contest.

Cash Awards: 1st award, $1,000; 2nd award, $500; 3rd award, $250.

In case only one manuscript is adjudged meritorious, the entire $1,750 in cash awards will go to that author. If only two manuscripts are adjudged meritorious, the first award will be $1,175 and the second, $575. (Awards are in addition to royalties.)

Eligibility: Any person except employees of the American Technical Society and contest judges may participate in the contest.

Closing Date: Any manuscript delivered or mailed to the American Technical Society after May 1, 1948, and not later than December 31, 1949, will be eligible for the awards.

For further information write to the above given address.

New Publications

Television and F-M Receiver Servicing

By Milton S. Kiver. Paper, 212 pp., 8½ by 11 in., illus., $2.95. D. Van Nostrand Co. Inc., 250 Fourth Ave., New York 3, N. Y.

This book contains directions for installing television receivers and for diagnosing, locating, and repairing the common troubles of F-M or television receivers. Just enough mathematics is given to enable the serviceman to compute properly the lengths of transmission lines and antennas which are so vital to television receivers. Beyond this, math is seldom used — the word explanations give the full story.

The explanations follow a logical step-by-step procedure touching every circuit in F-M and television receivers. In addition, complete alignment and servicing instructions are given at each point. These are summarized in separate chapters (one for television and one for F-M) so that explanations and instructions throughout the book are fully co-ordinated. There are numerous illustrations of circuit diagrams, television components, and test equipment to familiarize completely even the novice.

(Continued on page 42A)

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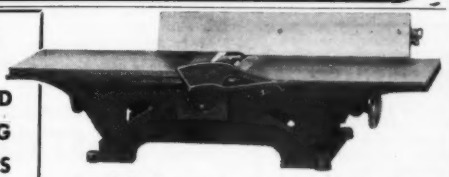

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(Continued from page 40A)

Gem Cutting

By J. Daniel Willems. Cloth, 224 pp., 6⅛ by 9 in., illus., $3.50. The Manual Arts Press, Peoria 3, Ill.

A book that will delight anyone who is interested in gem cutting. It is well written, copiously illustrated, and the directions for performing the various operations are clearly explained — step by step.

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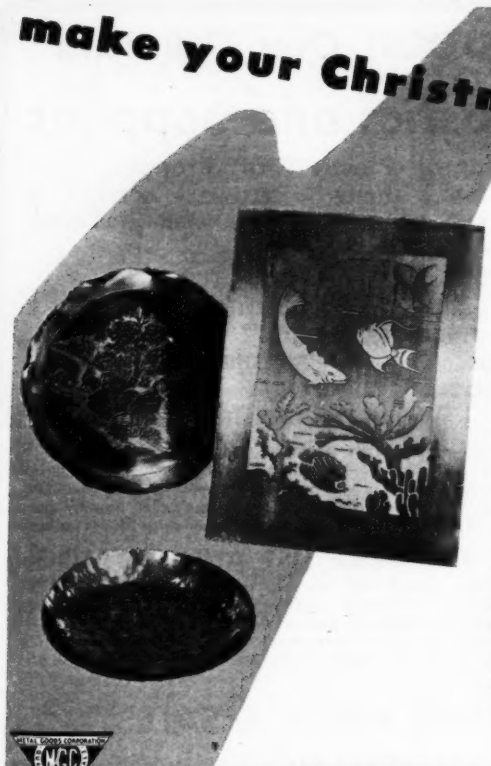

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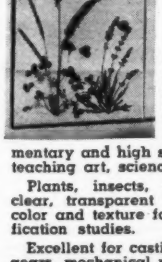

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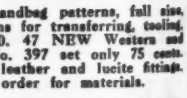

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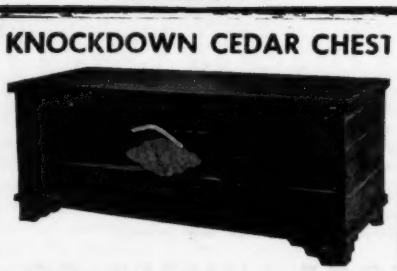

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